THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE — MAY, 1946

Did You See the **Champion Paper Advertisement**

in "FORTUNE" MAGAZINE

HOUR after hour, day after day, Champion's seventeen giant machines are laying highways of paper over which moves the business and cultural life of the nation. Their daily output is equivalent to 1600 miles of fifty-four roadway, more annually than two super highways to the moon. Champion now is returning to peacetime operation, and their new papers and processes ultimately will enhance the Champion line and your business. Coated and uncoated papers for letterpress and offset printing, business papers, fine package wraps, and stocks for greeting cards, liquid containers, food packages and other specialties . . . all are Champion, all are quality, all are business getters. Make your choice Champion.

THE *Champion Paper* AND FIBRE COMPANY

HAMILTON, OHIO—MILLS AT: HAMILTON, OHIO

Manufacturers of Advertisers' and Publishers' Coated Papers, Coated Boards, Tablet Writing and Printing Papers, Envelope Papers, Tablet Writing and Printing Papers

Domestic Sales Offices: NEW YORK · CHICAGO · PHILADELPHIA · CLEVELAND · BOSTON · HOUSTON, TEXAS · ATLANTA

Downingtown Suction Rolls are used on thirteen of the seventeen paper machines mentioned in their advertisement. Of their total daily production, equivalent to 1600 miles of fifty foot roadway, the machines "Downingtown Equipped" account for 75 percent or the equivalent of 1225 miles of fifty foot roadway. . . . Our first order from "Champion" covered 10 Suction Presses; since then, they have ordered Downingtown Suction Couch, Suction Press and Suction Felt Rolls.

DOWNINGTOWN MFG. CO.
DOWNINGTOWN, PENNA.

DOWNINGTOWN

Designers & Builders
Paper Making Machinery

EVAPORATORS-CONDENSERS-FILTERS

One frequently neglected source of economy that is particularly adaptable to post-war plant improvement is the use of a surface Condenser on a multiple-effect Evaporator.

The use of a low-cost surface Condenser makes possible the conversion of low temperature heat, usually wasted, to the heating of wash waters.

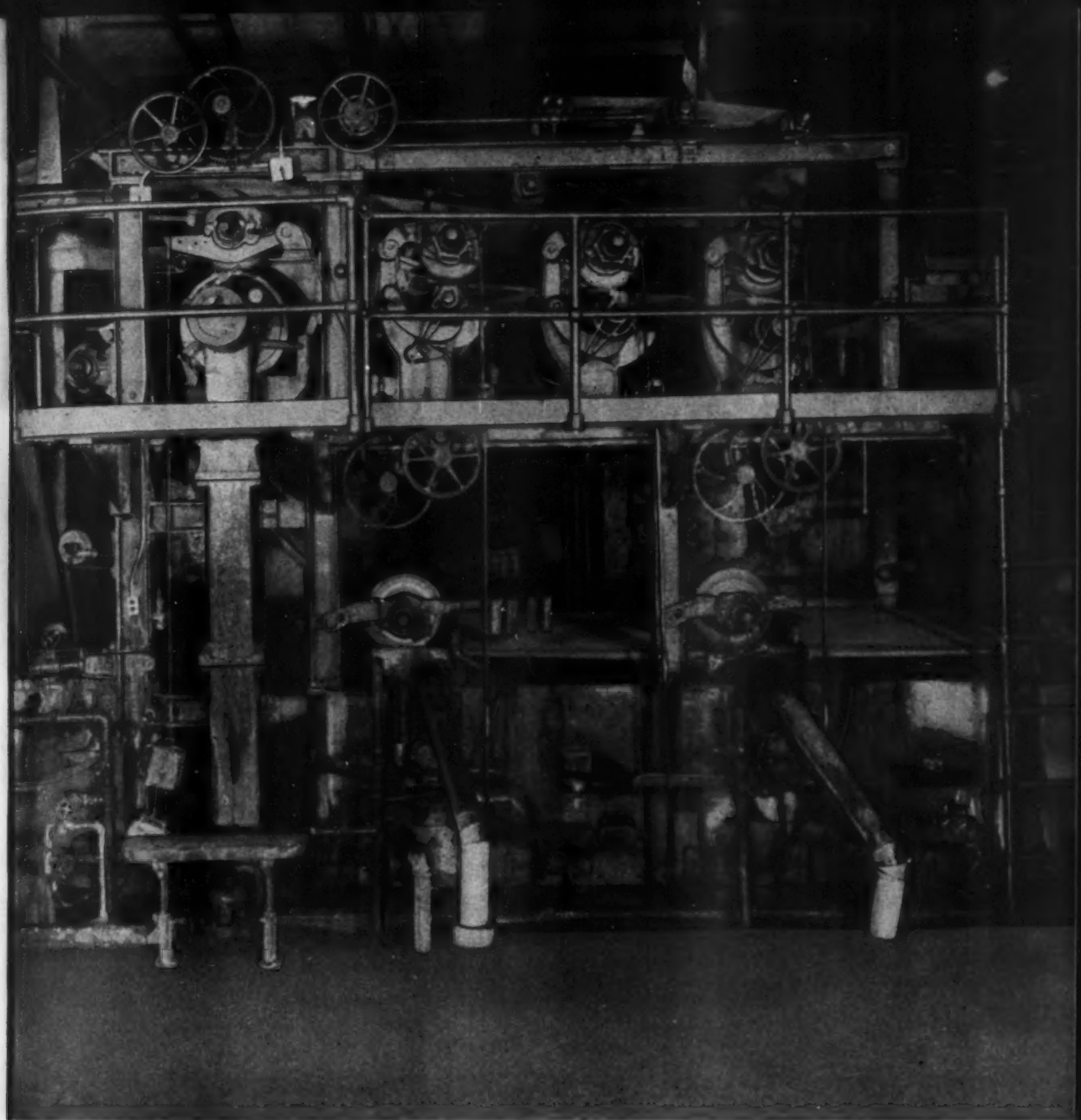
The services of Goslin-Birmingham's Reconversion Department are available for the study of your individual plant problems. A thoroughly-trained, experienced staff of engineers fully abreast of current conditions and post-war operational methods, stands ready to serve you.

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC

BIRMINGHAM ALABAMA

350 MADISON AVE NEW YORK

CHICAGO SAN FRANCISCO NEW ORLEANS SEATTLE



Very definite advantages . . .

For existing cylinder machines making high-grade board, the Beloit suction drum press with short felt and suction primary has many very definite advantages. For example: ten to fifteen per cent water removal—reduced felt cost—beneficial effect on finish—increased production possibilities. Furthermore, it is not necessary to slow down machine speed as felts get old. And there is no checking or blowing; wet end breaks are largely eliminated. Installations have been very successful.—*Beloit Iron Works, Beloit, Wisconsin.*

BELOIT IRON WORKS PAPER MACHINERY BELOIT, WIS. U.S.A.

WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!

BELOIT

PAPER MACHINERY

New

ELECTRONIC RESISTANCE THERMOMETER

for Pulp and Paper

THE BAILEY PYROTRON

As a resistance thermometer the Pyrotron indicates, records and controls temperatures between-100°F and 1200°F. It simultaneously records as many as four temperatures on its 12-inch chart, or may record and control as many as two temperatures.

An independent continuously connected measuring circuit serves each recording unit. These circuits are kept in continuous balance by sturdy motion-free electronic detectors which do away with the delicate parts and "step by step" action of galvanometer type instruments.

Indicating, recording and controlling instruments are furnished in rectangular casings as illustrated. Indicating and controlling instruments are furnished in 12-inch round type casings.

CHOICE OF THREE CONTROLS

Bailey Pyrotrons are furnished with the following types of Automatic Control:

1. AIR OPERATED—Uses standard Bailey Pilot Valves, air relays, control valves and control drives. Operates by compressed air at 35 lb. pressure.

2. ELECTRONIC—Uses standard electronic control panel operated from a control bridge in the Bailey Pyrotron.

3. ELECTRIC CONTACTS—Uses micro switches on slidewire unit or electronic relay operated from control bridge in the Bailey Pyrotron. P-5

UNUSUAL FEATURES OF THE BAILEY PYROTRON

Suitable for severe service where vibration and shock exist.

Measuring circuit operates from instrument power supply eliminating need for standard cell and dry battery.

Sturdy electronic system maintains continuous balance.

Motor drive furnishes abundant power to operate recorders, controllers and alarm switches.

Two recording controllers may be housed in one casing.

Electronic units may be interchanged without disturbing instrument calibration.

For details, request Bulletin 230-A "Bailey Pyrotron Electronic Resistance Thermometer".
Bailey Meter Company, 1058 Ivanhoe Road, Cleveland 10, Ohio.
In Canada—Bailey Meter Company Limited, Montreal.

BAILEY METER COMPANY

1058 IVANHOE ROAD • • • CLEVELAND 10, OHIO

Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
% COMBUSTIBLES
FLOW
LEVEL
DENSITY
RATIO

MODERN HANDLING METHODS

Now a Must!

There's no time to lose in getting operating costs on a competitive unit-cost basis. Modern methods of handling are now a *must.* Electric industrial trucks, for example! Palletized loads! And, of course, the newest development in motive power Storage Batteries . . . the sensational Philco "Thirty" that gives 30% longer life! Try Philco "Thirty" in your hardest-working trucks. The tougher the job the better it shows up. Write for the facts today.

● The new Philco "Thirty" Industrial Truck Storage Battery, that gives 30% longer life, is identified by its distinctive red connectors.

PHILCO *Famous for Quality the World Over*

FOR 30 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Tune in the Philco Radio Program, with Paul Whiteman and His Orchestra, Sundays, 6 P. M., EST; The Breakfast Club with Don McNeill, 9:45 A. M. EST, Monday through Friday—ABC (Blue) Network.

PHILCO CORPORATION · STORAGE BATTERY DIVISION · TRENTON 7, NEW JERSEY

C2 =

MAXIMUM STRENGTH AT ANY BRIGHTNESS

You can bleach Kraft, sulfite, soda, rag and flax pulp to high brightness with *absolute minimum* loss of fiber strength by using Mathieson C2 (Sodium Chlorite), the powerful, efficient oxidizing agent that's so easily and safely controlled.

C2 steps in at the point of greatest value—at the final stage of bleaching when it is essential to exert the greatest care in avoiding degradation of the cellulose. C2 won't damage cellulosic fiber . . . even under conditions of high temperature, low pH or high chemical concentration.

For higher profits in a market that will become more and more competitive, use C2—the modern way to brighter, stronger paper products. Write for information: The Mathieson Alkali Works (Inc.), 60 East 42nd Street, New York 17, N. Y.

Caustic Soda . . . Soda Ash
Bicarbonate of Soda . . . Liquid Chlorine . . . Chlorine Dioxide
Ammonia, Anhydrous & Aqua
HTH Products . . . Fused Alkali Products . . . Synthetic Salt Cake . . . Dry Ice . . . Carbonic Gas . . . Sodium Chlorite Products . . . Sodium Methylate

Mathieson
CHEMICALS

THE PAPER INDUSTRY and PAPER WORLD

(Reg. U.S. Pat. Off.)

VOLUME 28 - - - - - - - MAY, 1946 - - - - - - - NUMBER 2

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Higher Finish- LOWER COST

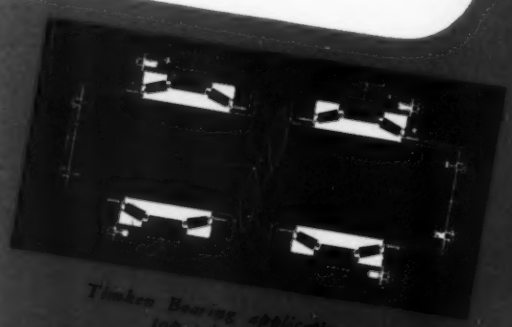
with supercalenders operating on TIMKEN BEARINGS

Improved finish, increased production and reduced cost are the rule when supercalender rolls are mounted on Timken Tapered Roller Bearings.

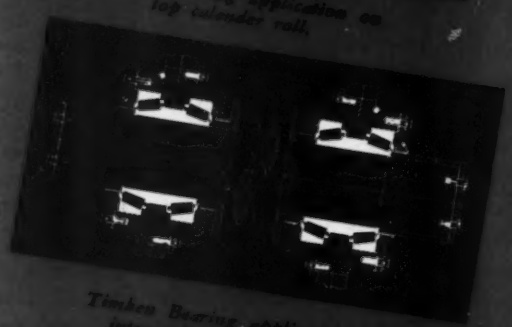
The finish is uniformly better because the rolls are constantly held in dead true alignment, with even pressure maintained from end to end.

Production is increased because, with friction eliminated, faster operation is permissible. Cost is reduced because higher speeds can be attained with existing power units—no power loss through friction. Additional factors of cost reduction are: simplified and economized lubrication; no lubricant leakage, therefore no paper spoilage — full width of roll usable; saving of operating time because supercalender stacks usually can be started without raising the weights.

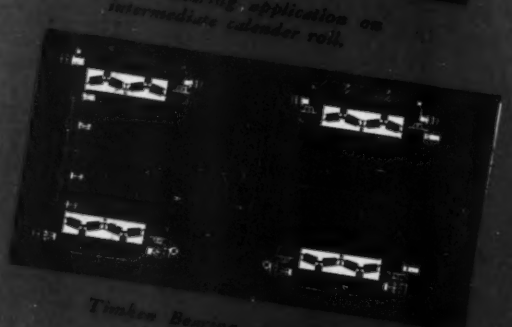
Your present supercalenders can be changed over to Timken Roller Bearings at moderate cost. Consult the equipment builder or our engineers. The Timken Roller Bearing Company, Canton 6, Ohio.



Timken Bearing application on top calender roll.



Timken Bearing application on intermediate calender roll.



Timken Bearing application on bottom calender roll.

TIMKEN

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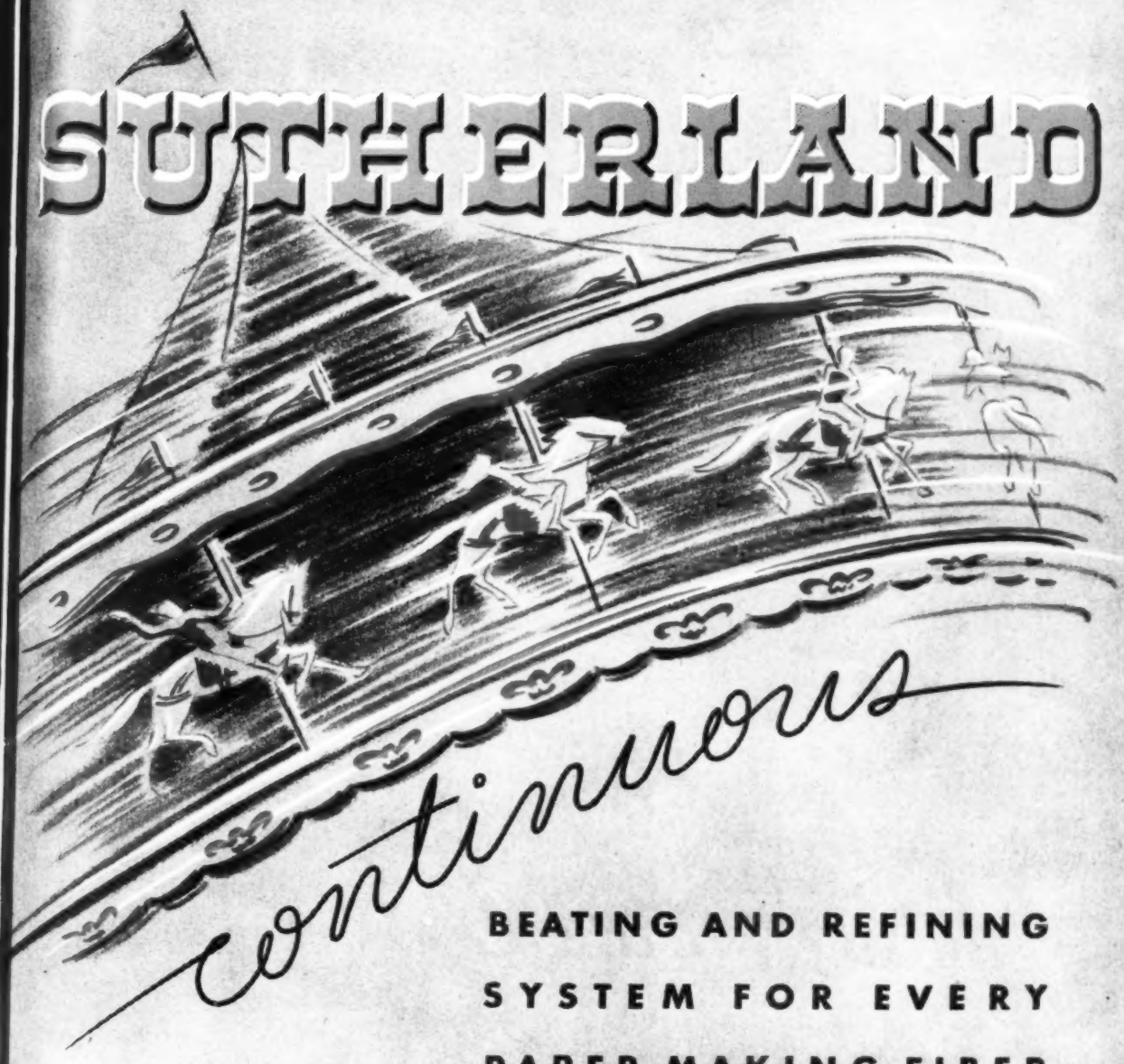
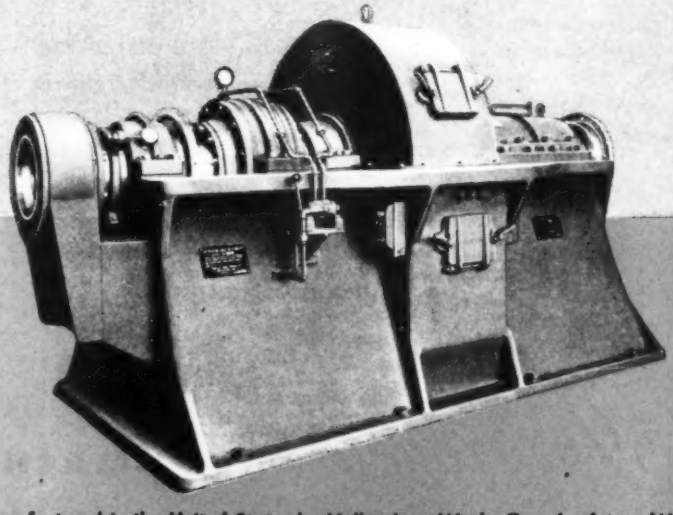
TAPERED ROLLER BEARINGS

SUTHERLAND



continuous

BEATING AND REFINING SYSTEM FOR EVERY PAPER MAKING FIBER

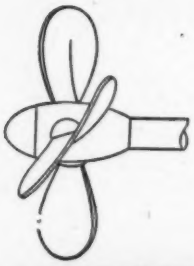


SUTHERLAND REFINER CORPORATION

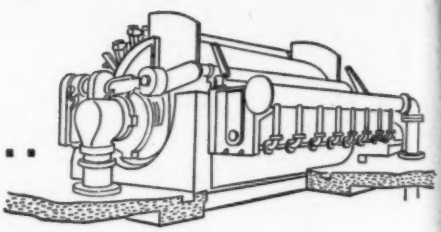
TRENTON, NEW JERSEY · *Manufactured in the United States by Valley Iron Works Co., Appleton, Wis.*

SUTHERLAND REFINER LIMITED, 319 DRUMMOND BLDG., MONTREAL, P.Q., *Manufactured in Canada By The John Bertram & Sons Co. Ltd., Dundas, Ontario*

An Agitator?...



A Washer?...



A Bleach Plant?

Save time—
Check with *Improved*

Impco offers:

A complete line of equipment for processing every kind of pulp.

The steady development of new machines for new needs.

Engineering cooperation with your operators and engineers.

- Liquor Removal Washers
  Kraft, Soda and now Sulphite!
- Knotters
- Screens
  Flat and Centrifugal
- Deckers
  Vacuum and Gravity
- Wet Machines
- Bleaching Equipment
  For High and Low Density
- Storage Systems
- Agitators

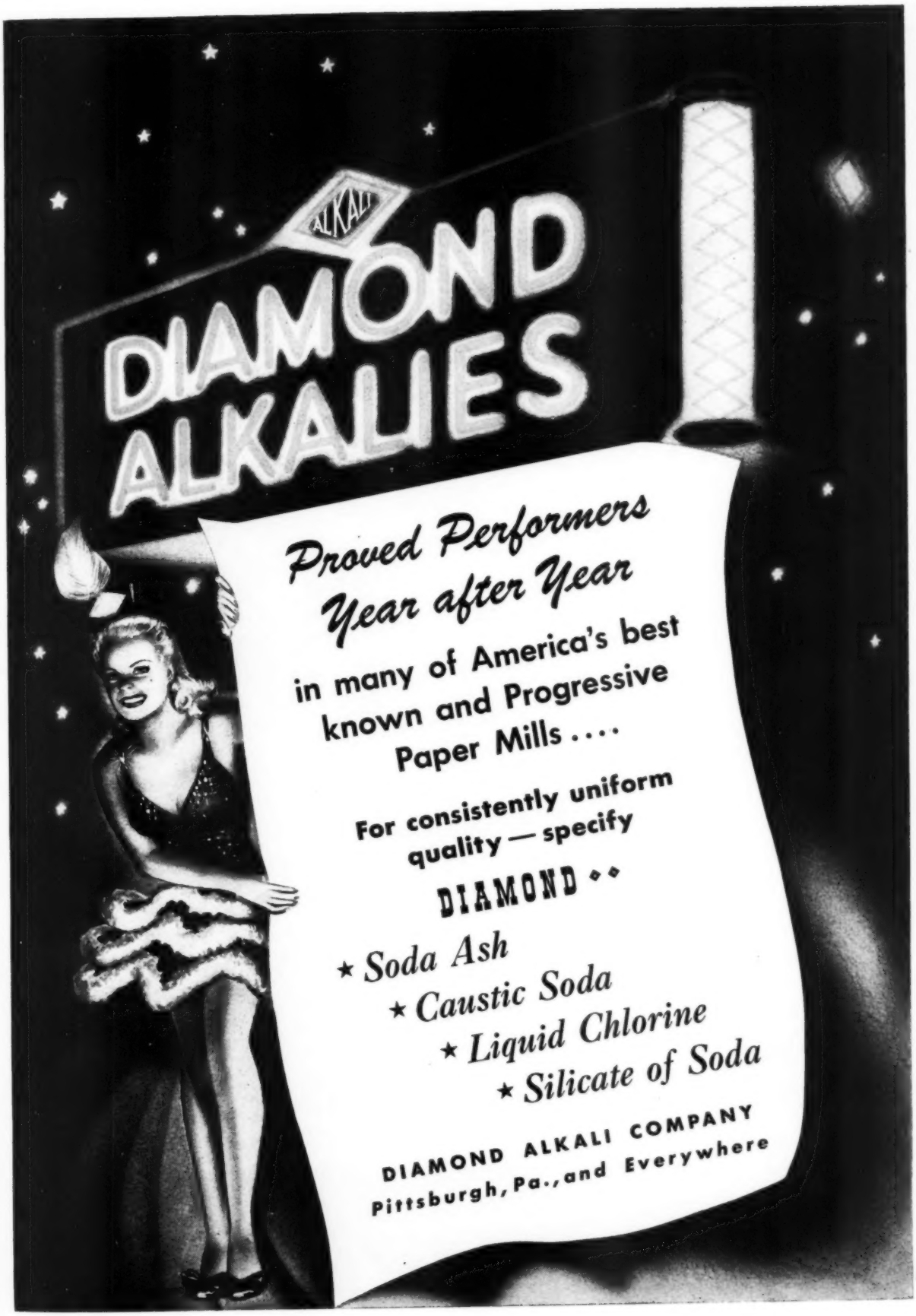
Let us work with you

Improved **PAPER MACHINERY CORPORATION**

NASHUA • NEW HAMPSHIRE

N

946


DIAMOND ALKALIES
Proved Performers Year after Year
in many of America's best known and Progressive Paper Mills ....
For consistently uniform quality — specify
DIAMOND
★ Soda Ash
★ Caustic Soda
★ Liquid Chlorine
★ Silicate of Soda
DIAMOND ALKALI COMPANY
Pittsburgh, Pa., and Everywhere

THE SIZE YOU

IT PAYS TO KNOW *MORE* ABOUT

HERCULES

U WANT WHEN YOU WANT IT!

For virtually any type of paper or paper product, Hercules has the size you want, *when you want it!* This service to papermakers, maintained consistently even throughout the war, stems from the fact that Hercules is the world's largest producer of rosin and rosin derivatives, and has at its command a thorough knowledge of rosin chemistry.

Hercules' wide range of sizing materials includes rosin sizes to meet the most diversified requirements. These sizes are available in three basic forms — dry, paste, and emulsion. Produced from a series of resins and modified resins, they can be tailor-made to meet practically every sizing need.

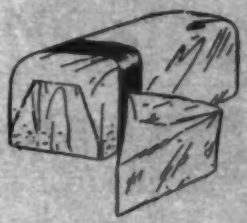
In addition, there are numerous Paracols* (wax and wax-resin emulsions) for sizing. Covering a wide range of compositions and properties, they impart special properties to the finished sheet.

Hercules Staybelite* size constitutes another useful development — when specialty papers are required which must be unusually bright, tasteless, and permanent.

If size or its application is important to you, why not let our technical representatives tell you about the many standard and specialty sizes made by Hercules.

*Reg. U. S. Pat. Off. by Hercules Powder Company

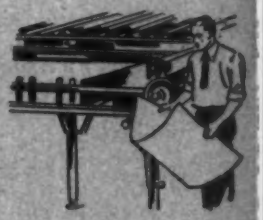
Other Hercules chemical materials for the paper industry include:



Staybelite* Esters...
Wax additives for coating and laminating processes, modifiers for GRS and Neoprene latex for impregnating and laminating paper and board stocks.

Hercolyn*
A liquid resin for transparent izing. Possessing excellen fiber-wetting properties, it i useful for the production o transparent and translucen papers.

Chemical Cotton...
Hercules chemical cotton is a pure cellulose, in loose or sheet form. Cleanliness and brightness are outstanding.



Casein...
Hercules casein is used as the binder in clay-coatings, and as an adhesive in laminant and paper converting.

Vinsol* Resin...
A dark-colored resin with a high melting point. Low in cost, it is economical as a stiffener for paperboard.

Chemicals...
These include sulphonated oils, foam killers, oveners, acids, alkalies, alum, and satin white.

FOR FURTHER DETAILS

Papermakers Chemical Department
HERCULES POWDER COMPANY
INCORPORATED
961 King Street, Wilmington 99, Delaware

Please send information on_____

*Name*_____

*Title*_____

*Company*_____

*Address*_____

CHEMICAL MATERIALS FOR THE PAPER INDUSTRY

Are You a Member?

Join the Green Cross for Safety Campaign—the best accident insurance you can buy. Wear your badge, if you have one. But do sign up. (See page 244)

(Illustration on this page is from the May cover of *National Safety News*, and is reproduced with full permission of the National Safety Council.)

TRADE WINDS

Wastepaper Program Well Organized

▶▶▶ Midwest Consumers of Waste Paper have received a progress report for the first three months operation of its $250,000 Public Relations program conducted by Frank Block and Associates. The program, aimed at improving dealer-mill relationships and stimulating the flow of wastepaper in eleven Midwest States, was begun in January by the Public Relations Committee of the Midwest Consumers of Waste Paper, of which W. H. Beckwith, vice president of the Morris Paper Mills, Morris, Illinois, is chairman. The four other members of the committee are: P. A. Schilling, president of the Waldorf Paper Products Company, St. Paul; Earl W. Schneider, vice president of the Eddy Paper Corporation, White Pigeon, Michigan; Marvin W. Swaim, vice president, Alton Box Board Company, Alton, Illinois; and W. I. Osborne, Jr., president of the Cornell Wood Products Company, Cornell, Wisconsin.

180 Collection Programs Under Way

Through thirteen public relations specialists as field representatives for the Block organization, the program reaches out into 384 communities in the following states (the figure in parenthesis indicates the number of representatives for each state): Iowa (1), Illinois (2), Indiana (2), Michigan (2), Missouri (1), North Dakota and South Dakota (1), Ohio (2), Tennessee and Kentucky (1) and Wisconsin (1). As of March 31, 80 per cent of these communities had been contacted and wastepaper collection programs had been started in 180 cities. In each instance, these collection programs provide for the inclusion of the local wastepaper dealer. The 384 cities selected for intensive work all have daily newspapers with circulations exceeding 3,000. The program involves monthly personal visits with 435 newspaper publishers and editors.

Plan of Operation

During the first month of the program, the field representatives contacted all of the mills in their territories explaining details of the program to mill executives and gathered "on the spot" information on mill paper stock problems. Following the mill visits, a quick trip was made through the respective territories where the status of wastepaper collection groups activated during war years was determined. This information largely came through contacts with editors and publishers and, in many instances, representatives found that by stepping in immediately and backing the war-created programs with advertising and news stories, campaigns which otherwise would have been abandoned were revived and have continued to operate. In communities where no collections were taking place, it was the job of the representative to "develop a sponsor," such as a Boy Scout organization, or church, civic or fraternal group, pointing out to them the profits to be earned by collecting. All such sponsored programs must have specific collection dates and are backed by display advertising in the local daily newspaper, this item constituting a large portion of the quarter-million-dollar annual budget. In addtion to the paid advertising, sponsors are furnished free publicity material such as display posters, pamphlets pictorially telling how waste paper is made into finished products and with door-knob hangers to remind the community of "Collection Day." As of March 31, over 175,000 pamphlets, "The Story of Waste Paper," and 290,000 door-knob hangers had been distributed to sponsors and dealers, together with thousands of posters and other media for stimulating public co-operation.

Sheep, Chimes, and Memorials Purchased

Special news stories prepared in communities by Block representatives and co-operative editors have shown collections range as high as 50 to 100 tons of waste paper in a single drive. Organizations are using money from sales for a wide variety of purposes. One sponsor, a 4-H Club, plans purchase of sheep for its class.

A school is working hard to collec- enough paper to pay for an intercommunication system. Summer camping and purchases of surplus army camping equipment are Boy Scout goals while a sheriff's office staff is working to buy a two-way radio system. Several veterans' organizations are campaigning for funds for new buildings and war memorials. The church organization in one community is collecting paper to earn funds for a set of chimes for the steeple.

The Mill-Dealer Relationship Phase

In addition to aiding mill-dealer relations by rendering a real money-making service to dealers, field representatives are conducting a survey of baling equipment facilities and requirements throughout the Midwest. At the same time, they are exploring all possible sources of unused balers in order to supply the dealers with information on how and where they may be purchased. One of the major objectives of this survey on equipment is to enable dealers, through the use

of balers, to obtain a long-range permanent market for paper-stock. Representatives' reports have shown enthusiastic reception of the program by dealers. In many instances, dealers have participated in the advertising, assisted in setting up campaigns and have co-operated in the mechanics of collections. In some instances, dealers are transporting members of sponsor groups to mill for prearranged conducted tours.

The Program Staff

In addition to Frank Block as counsel, the program for the Midwest Consumers of Waste Paper is supervised by John F. Kinerk, field director, who formerly was program director for the War Manpower Commission in Washington. Ten of the thirteen field representatives are veterans of World War II with service in the Army, Navy and Marine Corps. Ten of the representatives are experienced newspapermen; three of them formerly headed War Salvage Programs in their respective states for the War Production Board.

Program Enters Second Phase

The success of the program, now entering the second quarter, is indicated by the fact that, rather than a continuation of the drop in wastepaper receipts which began with V-J Day, the volume has been maintained at a level slightly higher than in war years 1944 and 1945. Current inventories are considerably higher than in 1944 and are about equal to 1945. The three major objectives for the second phase of the program are: continued improvement of dealer-mill relations; increased volume of wastepaper collections from programs already established; and the development of new sponsors and programs in the 128 communities where wastepaper collections are still dormant.

◆

CONTROL OF OHIO WAX PAPER CO. ACQUIRED BY POLLOCK PAPER & BOX CO.

A controlling interest in the Ohio Wax Paper Company, Columbus, Ohio, has been acquired by The Pollock Paper & Box Company, Dallas, Texas.

Edward Palmer, president of the Ohio Wax Paper Company since 1929, has sold a controlling interest in that company to the Texas company. He is retiring from active business. The new president is Leslie L. Jacobs, executive vice president of The Pollock Company.

The firm will continue operations in Columbus, operating as a division of The Pollock company.

NEW BARK BY-PRODUCTS HAVE BEEN DEVELOPED AT WEYERHAEUSER CO.

Three new by-products of bark as developed by technicians of Weyerhaeuser Timber Company were first announced recently in Longview, Washington. The three by-products introduced by Clark C. Heritage, technical director of the Weyerhaeuser company are: (1) a plastic, from which such articles as telephones can be made; (2) a new and more economical plywood glue; and (3) an effective component for insecticides.

For the time being, none of the finished products will be manufactured by Weyerhaeuser. The materials will be sold to companies engaged in manufacturing the various types of products for which the bark processes are adaptable.

◆

TONS OF GERMAN PATENT DOCUMENTS WILL SOON BE DISTRIBUTED IN THE U.S.

In a late release from the Office of the Publication Board, Department of Commerce, Casper W. Ooms, Commissioner of Patents states that ten tons of documents taken from the German Patent Office are now being sorted and evaluated and eventually will be disseminated for the benefit of American science and industry.

Originally seized by the United States Army in Germany, the documents were shipped to Wright Field in 146 packing cases. Army authorities then turned the documents over to the Office of the Publication Board, Department of Commerce, for dissemination to the public through its facilities. The United States Patent Office and OPB are co-operating in sorting and evaluating the documents.

Prior to 1939, patent information was regularly exchanged between Germany and this country, Mr. Ooms said. Since then, however, thousands of German patents have been issued of which we have no knowledge. It is this file of patents issued during the war that is of particular interest to the United States Patent Office, Mr. Ooms said, and many of these patents will be placed on file in the Patent Office Search Room for public use.

At the same time OPB will bring the documents to the attention of the American public. Each document selected as worth-while will be abstracted and listed in OPB's weekly "Bibliography of Scientific and Industrial Reports," which is available on subscription from the Superintendent of Documents.

After the German patent documents have been sorted and evaluated, those not selected for retention in the Patent Office will be returned to Germany to help the German Patent Office get back on its feet.

There is no thought of stripping the German Patent Office of all of its documents, according to John C. Green, Executive Secretary of OPB. Only selected items that are considered to be of particular interest to American business will be retained in this country, he explained.

◆

NAT'L CONTAINER CORP. ACQUIRES CONTROL OF THE TOMAHAWK KRAFT PAPER CO.

In Wausau, Wisconsin, Samuel Kipnis, president of the National Container Corporation (New York City), announced on May 17 that his company had acquired the controlling interest in the Tomahawk Kraft Paper Company, Tomahawk, Wisconsin.

The bidding for stock of Tomahawk has been in progress for some time (Cf. P.I. & P.W. April, 1946, p. 20). Bemis Bro. Bag Company, of St. Louis, has been a runner-up for Tomahawk control, since that company took about 25 per cent of the mill's output.

National Container acquired the Tomahawk stock on an offer of $23.25 per share. In announcing the transfer, Mr. Kipnis stated that his company intends to convert the product of the Tomahawk mill to kraft liner board. As soon as conditions will permit, he stated the capacity of the mill will be increased and a converting plant for manufacturing corrugated paper containers will be installed.

◆

ASSOCIATIONS URGE USERS TO VOLUNTARILY CONTROL WEIGHTS OF PAPER USED

The three industries which use the bulk of the nation's book, groundwood and fine paper, have urged that paper usage be restricted voluntarily to those weights manufactured under the former WPB order L-120 schedules I to XIV, June 5, 1944 (as amended) which order limited the weights of paper that paper mills could produce.

The National Publishers Association, representing magazine publishers; Printing Industry of America, Inc., representing commercial printers; and the American Book Publishers Council have sent a statement to all of their members making this request. The release also states "The decision to conduct a voluntary campaign to reduce the weights of paper being used was thoroughly discussed with officials of the American Paper and Pulp Associa-

PAPER · · · America's 6th Industry

PAPER BAGS FOR VACUUM CLEANERS

(NEWS ITEM: A *paper filter bag for vacuum cleaners is helping to take the work out of housework.*)

The newest of streamlined household appliances is a vacuum cleaner with a paper filter bag inside the regular vacuum bag. Attached to the exhaust end of the cleaner, the paper bag gathers all the dust for easy and clean disposal. Unlike ordinary vacuum cleaners which require cleaning after each use, this airtight bag can be used as long as six weeks without danger from germ-laden dust.

Paper packaged fuel . . . paper cartons for light bulbs . . . paper baking dishes . . . paper paint cans . . . New uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for book and high grade printing, one for white paper for bags, and one for Kraft liner board; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

tion. It was recognized that the reimposition of government controls at this time would be inopportune and contrary to the general trend. On the other hand, there was no voiced objection to a voluntary effort on the part of users to reduce weights."

◆

PACIFIC MILLS CONSIDERS BUILDING POWER PROJECT

The development of a power project to cost $2,000,000 is under consideration by Pacific Mills, Ltd., Ocean Falls, British Columbia. H. G. Acres & Company, consulting engineers at Niagara Falls, have been retained to investigate the proposed hydroelectric development, which will harness the Nascall River where it flows into Dean Channel.

It is estimated the Nascall River power development will produce approximately 15,000 horsepower, delivering about 10,000 kilowatts of power to supplement the present hydroelectric power supply at the Ocean Falls plant.

◆

TENTH ANNUAL EXECUTIVES CONFERENCE AT INSTITUTE

The tenth annual executive conference was held at the Institute of Paper Chemistry, Appleton, Wisconsin, May 16-17.

Addressing the conference on the first evening was Major General William J. Donovan, formerly director of the Office of Strategic Services and assistant chief of the United States War Crimes Commission. Major General Donovan was an officer in the Rainbow Division in World War I, and he was welcomed on his arrival in Appleton by veterans of that Division.

Guest speaker at a luncheon meeting on the second day of the Conference was Brigadier General Georges F. Dorlet, head of the Military Planning Division, Quartermaster corps.

A symposium on "Trends" was held on the first day of the conference. John G. Strange, of Appleton, was discussion leader.

◆

A REPORT DESCRIBING GERMAN EVAPORATOR IS RELEASED BY GOVERNMENT

A German "rapid current evaporator" for evaporating solutions which are sensitive to temperatures or which tend to decompose, discolor, or separate in crusts is described in a report recently issued by the Office of the Publication Board, Department of Commerce.

The evaporator has proved useful in processing such solutions as tomato and fruit juices, tanning liquors, pectin, vitamin preparations, glue and gelatine solutions. It is also claimed to be effective in processing waste sulphite liquor and industrial waste water. The apparatus is readily adaptable to plant operating conditions. Full details of its construction and uses are given in the report. Orders for the report (PB-17920; photostat, $4; microfilm, $1; 40 pages) should be addressed to the Office of the Publication Board, Department of Commerce, and should be accompanied by check or money order, payable to the Treasurer of the United States.

PUGET SOUND PULP AND TIMBER COMPANY PLANS TO CONSTRUCT A BOARD MILL

Plans for building a board mill on waterfront ground adjoining the main plant, have just been announced by The Puget Sound Pulp and Timber Company, Bellingham, Washington. The cost of the expansion has not been revealed.

The company was started in 1926, and has property, timber, and assets totaling $8,000,000; also a million-dollar unit for extracting ethyl alcohol from waste liquor. The mill is one of the large producers of unbleached sulphite pulp.

According to the company's 1945 annual report, it purchased forest reserves totaling 318 million feet in Canada during 1945 in anticipation of the time when Canadian logs again can be shipped in quantity to the United States.

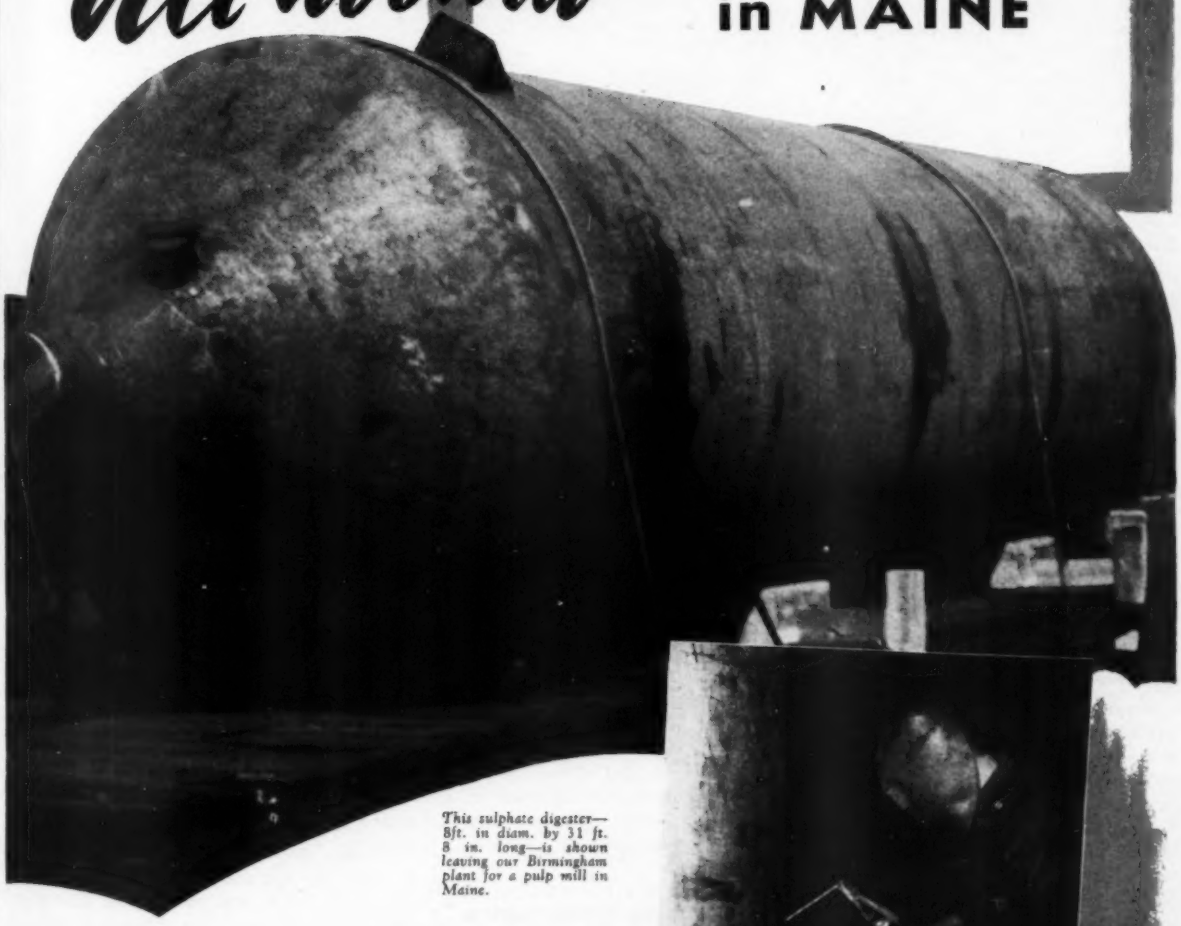
◆

U.S. PULP MILLS MAKE PLANS TO PRODUCE HIGH PROTEIN LIVE STOCK FEEDS

At a meeting of the West coast pulp and paper mills held at Portland, Oregon, on April 17, 1946, plans were formulated to study the production of high protein live stock feeds from the utilization of wood sugars as a by-product of wood pulping operation. In addition to producing large quantities of sorely needed high protein yeast for supplementary feeding of cattle, poultry and other live stock, indications are that substantial reduction in the pollutional characteristics of effluents from sulphite pulp mills,

A group of paper mill executives who attended the Tenth Annual Executives Conference of the Institute of Paper Chemistry, Appleton, Wisconsin. Left to right: C. B. Sitterson, Jr., of the Institute; W. C. Johnson, Allis-Chalmers Mfg. Co., Milwaukee; Herbert Randall, of The Champion Paper and Fibre Co., Hamilton, Ohio; D. K. Brown, of the Neenah Paper Co., Neenah, Wis. (Mr. Brown is a past president of the American Paper and Pulp Association); H. G. Boon, Kimberly-Clark Corp., Neenah; Ernst Mahler, of Kimberly-Clark Corp., Neenah; Reuben B. Robertson, Sr., of The Champion Paper and Fibre Co., Hamilton, Ohio, and president of the American Paper and Pulp Association; Walter Geist, Allis-Chalmers Mfg. Co., Milwaukee, and Reuben B. Robertson, Jr., of The Champion Paper and Fibre Co., Hamilton, Ohio

All aboard for a pulp mill in MAINE



This sulphate digester—8ft. in diam. by 31 ft. 8 in. long—is shown leaving our Birmingham plant for a pulp mill in Maine.

● Paper and pulp mills that are to maintain their place in active competition are modernizing and expanding their plants . . . incorporating steel plate work that is designed and fabricated to meet their specific needs.

Our three fabricating plants are equipped to furnish you with all types of steel plate work including cylindrical tanks, diffusers, sulphate and sulphite digesters, cookers, bins, welded steel pipe, steel smoke stacks as well as Horton elevated water tanks for automatic sprinkler systems and general water service. Write our nearest office for estimating figures and quotations.

The photo above shows a welder at our Chicago plant working on a 9-ft. stainless steel section for a flare stack.

CHICAGO BRIDGE & IRON COMPANY

Chicago, 4.....**2445 McCormick Building**
New York, 6.....**3330-165 Broadway Building**
Cleveland, 15.....**2267 Guildhall Building**
Los Angeles, 14.....**1459 Wm. Fox Building**
Birmingham, 1.....**1511 North 30th Street**
Atlanta, 3.....**2143 Healey Building**
Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PENNA.

Tulsa, 3.....**1651 Hunt Building**
Houston, 1.....**8643 Clinton Drive**
Philadelphia, 3.....**1633-1700 Walnut Street Building**
Washington, 4.....**703 Atlantic Building**
San Francisco, 11.....**1217-22 Battery Street Building**
Detroit, 26.....**1566 Lafayette Building**
In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

which are currently considered a source of pollution to rivers and streams in the Northwest and other regions of the United States, will be made possible.

Current shortages of live stock feeds, particularly of the high protein variety exist in all regions of the United States. The shortages are particularly acute in the Pacific Northwest which is dependent on outside sources for such feeds.

During the war several plants were operated in Germany which produced yeast for human as well as stock feeding purposes. These installations have been examined by technicians representing Northwest mills and complete information regarding their operation has been obtained. Examination of the German process and preliminary experiments indicate that by techniques known in this country considerable improvement can be achieved over the German methods.

The research in connection with the production of yeast will be conducted at Oregon State College at Corvallis, Oregon, under the sponsorship of the National Council for Stream Improvement (of the pulp, paper and paperboard industries), Inc. The National Council was organized to conduct research to develop solutions to the pulp, paper and paperboard industries waste abatement and utilization problems.

Included in the yeast production research project at Oregon State College will be an intensified market study to determine the extent of national markets for the yeast product, and the design and construction of a pilot plant for the production of yeast for experimental and test feeding in the live stock producing states of the West. It is believed that this market research will indicate that an ample market exists.

Concurrently with the research project in connection with the production of high protein yeast foods, studies will be undertaken at Oregon State College to investigate fully the toxic effects of dilute kraft mill effluents on fish and aquatic life. This work will also be sponsored by the National Council and co-ordinated with similar investigations which have been carried on at the Institute of Paper Chemistry at Appleton, Wisconsin, for several years. Preliminary investigations indicate that such kraft wastes are not now generally present in Northwest waters in sufficient concentration to constitute a menace to fish and aquatic life. Possible expansion of kraft pulp production in the Northwest could in the future present a problem and the principal purpose of the investigation at Corvallis will be to establish basic data necessary to properly evaluate possible pollution from this source, and help to prevent its becoming a serious pollutional factor.

Attending the meeting at Portland were representatives of the following pulp and paper producers in this region, all of which are members of the National Council:

Coos Bay Pulp Corporation
Crown Zellerbach Corporation
Fir-Tex Insulating Board Company
Fibreboard Products, Inc.
Hawley Pulp and Paper Company
Inland Empire Paper Company
Longview Fibre Company
Puget Sound Pulp and Timber Company
Rayonier, Inc.
Soundview Pulp Company
Spaulding Pulp and Paper Company
St. Helens Pulp and Paper Company
St. Regis Paper Company (Kraft Pulp Division)
Weyerhaeuser Timber Company (Pulp Division)

Representatives of the Oregon State Sanitary Authority, Washington Pollution Control Commission and the Bonneville Power Administration were present at the meeting. Jack Taylor, director of the Washington Pollution Control Commission, addressed the meeting and expressed his interest in the announced plans and welcomed the efforts of the National Council to assist in finding solutions to the State of Washington's pollution problems. C. M. Everts, Jr., of the Oregon State Sanitary Authority, expressed his gratification at the industry's efforts to solve stream pollution problems.

◆

BRITISH PAPER NOTES
April 1946

Some interesting figures were given by Sir Stafford Cripps (president of the Board of Trade) at a luncheon held by the Waste Paper Recovery Association. The chief point in his speech was, of course, the need for greater efforts in the recovery of wastepaper. But incidently he disclosed that the production of all papers and boards by the British mills in prewar days was 2,650,000 tons and for this purpose Britain imported 1,700,000 tons of wood pulp, 225,000 tons of pulpwood, 350,000 tons of esparto grass, and in addition to a small amount of rag, the British mills consumed 575,000 tons of wastepaper. While in prewar days Britain exported 200,000 tons of wastepaper, this export has ceased today and the collection of wastepaper was so far below requirements it has been found necessary to import from Sweden a certain amount of wastepaper to keep the board mills going.

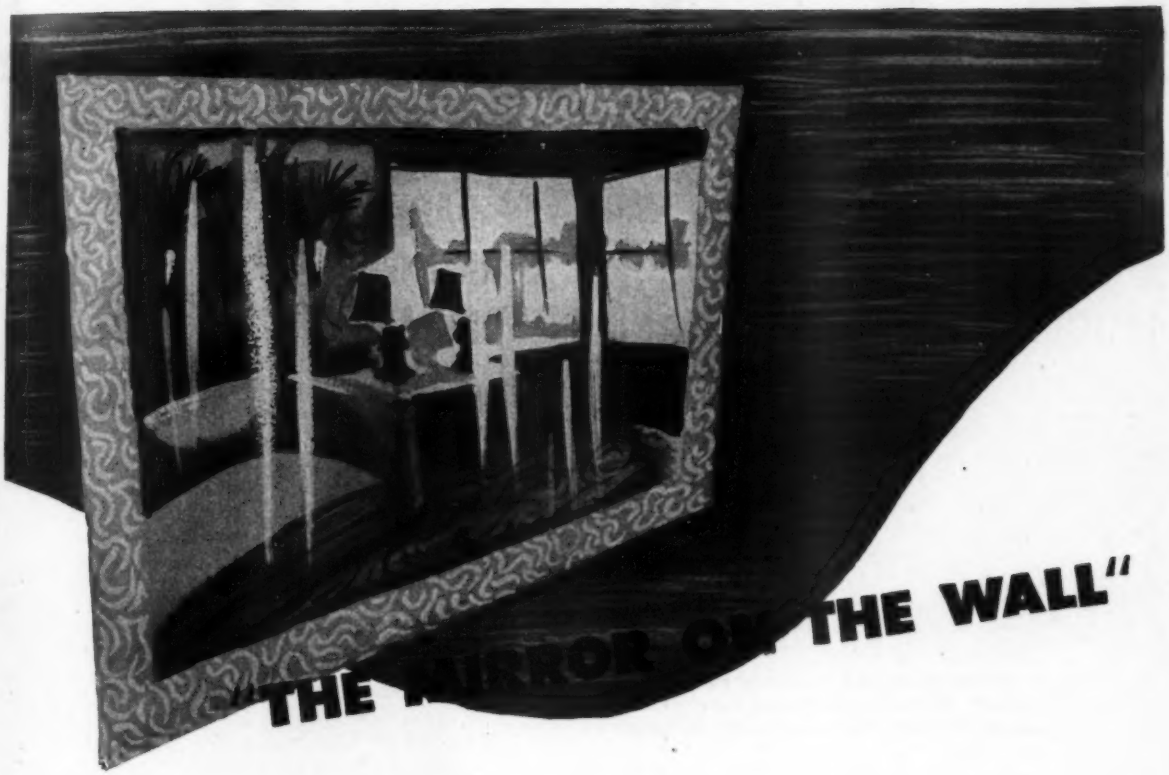
The collection of wastepaper, when the first national effort was made in 1940, reached 806,941 tons. It was about 50,000 tons short of this in the following year, but in 1942 totaled over 875,000 tons. Now, unfortunately, it was rapidly declining and during the last year reached only 582,943 tons. Sir Stafford called for an increase of over 100,000 tons for the present year. In this respect Thames Board Mill at Purfleet, one of the largest board mills in the world, has been conducting an excellent advertising campaign of its own to increase wastepaper collection.

Tied up with this subject of wastepaper collection are two factors which are operating against its success. The first is the very small amount of new paper which the general public is receiving, and the second the lack of labor in the transport world. This latter operates also with producers and merchants for not only are the paper merchants, in some cases, three weeks' behind in delivery but supplies from the Scottish mills to the London distributors are taking over a month to reach their destination. Thus, a printer requiring goods which have just left the makers may have to wait as long as two months for delivery.

Lack of transport is only one of the time limiting factors in the complete revival of the British paper trade. Another, the urgent need of more raw materials, was emphasized by Sir Eric Bowater at the annual general meeting of the Bowater Group. At this meeting A. B. Meyer, president of the Bowater Paper Company, Inc., New York, was present. Sir Eric after revealing that the combined trading profits of the operating companies, including the Newfoundland company, was £1,375,000, pointed out that the Paper Control had now allowed them to increase newsprint production from the wartime low level of 18½% to 33⅓% of prewar and he anticipated a further small increase this year. He also hoped that the permitted production of other papers and boards would reach 75% of prewar during 1946. He expressed the opinion that there would be a ready market for all papers resulting from the fullest operation of the British paper mills for many years to come. He also considered that the restriction of the supply of the necessary raw materials consequent upon the need to conserve foreign currencies is likely to prove a limiting factor for some time to come.

This lack of raw materials is dis-

(Turn to page 166)



Its smooth, even surface casts a perfect reflection—no distortion—no false impression. The same applies to a finely-produced gloss ink printing reproduction. When oil doesn't sink in—the results are smooth and even . . . casting a perfect reflection of fine craftsmanship. KELGIN, the modern algin SIZING AGENT, insures a surface ready for gloss ink printing. It applies easily . . . quickly . . . economically.

KELGIN is readily-soluble in hot or cold water. It is ideal for water-box application in the calender stacks. Simple to use, KELGIN does not cause picking—foaming—sticking to the rolls.

KELGIN is a product of Nature—free of impurities and processed under the most rigid specifications to produce a consistent, exact uniformity. Consult the Kelco Technical Dept. for fullest cooperation in your trial or experimental applications—No cost or obligation to you.

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13 Cords an Hour

A-C TOUR SHOWS OTHER MILLS DE-BARKING 6 to 10 CORDS PER HOUR . . . GAINING IN WOODROOM OPERATION AND PULP QUALITY

AT 30° BELOW ZERO OUTSIDE TEMPERATURE, in this leading Eastern Mill, Streambarker averaged 10 cords per hour on frozen Spruce! As temperature rose to 20° above, capacity jumped to 15 cords!

Mill officials figure Streambarker averages close to 13 cords per hour year 'round, "does the job faster . . . gets logs out cleaner and with fewer rejects than by conventional barking methods"!

Mill after mill can tell you about valuable savings — in stepped-up production, lower wood loss, better quality pulp — they're getting through Streambarker hydraulic log barking.

To figure accurately savings your mill can make, call your nearby A-C office, or write for "Streambarker Economics" bulletin B6391. ALLIS-CHALMERS, MILWAUKEE. A 2042

LOGS COME INTO Streambarker from pre-washing drum in which river water is used to remove ice and raise log temperature several degrees.

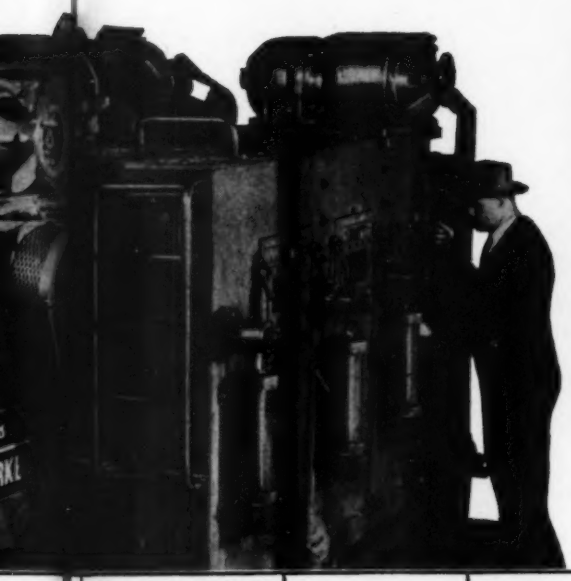
CHECK ACTUAL FIGURES REPORTED BY 12 DIFFERENT MILLS!

MILLS	Species of Wood Barked	Size of Logs Barked
MILL A	Spruce, Fir and Hemlock	4 to 18" diam., 4 ft. long
MILL B	Spruce, Fir and Poplar	4 to 18" diam., 4 ft. long
MILL C	Spruce and Hardwood	4 to 20" diam., 4 ft. long
MILL D	Spruce	4 to 18" diam., 4 ft. long
MILL E	Balsam, Hemlock, Spruce, etc.	4 to 20" diam., 4 ft. long
MILL F	Spruce and Fir	3 to 18" diam., 4 ft. long
MILL G	Spruce and Fir	3 to 18" diam., 4 ft. long
MILL H	Birch, Maple, Beech	4 to 18" diam., 4 ft. long
MILL I	Poplar and Spruce	4 to 20" diam., 4 ft. long
MILL J	Spruce, Fir, Pine, Hemlock	4 to 20" diam., 4 ft. long
MILL K	Pine, Birch, Poplar, etc.	3 to 20" diam., 4 ft. long
MILL L	Spruce	3 to 20" diam., 8 ft. long

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment— Biggest of All in Range of Industrial Products

...r WITH STREAMBARKER!



LOG GOES IN, is engaged by 2 bed rolls which revolve it under 3 high-pressure, bark-removing water jets.

LOG COMES OUT — bark *clean*, with *no* brooming of ends, with *no* dirt, and *no* surface rot!

...e of ...ogs ...rked	Streambarker Schedule		Water Pressure		No. of Men, Convey., Barker, Inspec.	Capacity Cords per Hour		Process in which Streambarked Wood is Used	Method of Bark Disposal	Miscellaneous Notes and Mill Comments
	Hours per Day	Days per Week	Summer	Winter		Summer	Winter			
...8" diam., ...ng	16 to 24	6 to 6½	750 lbs.	750 lbs.	4	9	6	50% Sulphite 50% Groundwood	100% to Boiler	Installing hot pond for winter barking. Expect to improve operation.
...8" diam., ...ng	9	6	670 lbs.	670 lbs.	3	10	8	100% Groundwood	100% to Boiler	"All steam generated by wood waste and bark," say Mill Officials.
...0" diam., ...ng	24—auxiliary to drums	6 to 6½	650 lbs.	650 lbs.	4			Bleached Sulphite	Bark to Dump	Streambarker used on wood which other barking equipment cannot handle.
...8" diam., ...ng	9 to 12	6	730 lbs.	730 lbs.	4	13	8½	88% Sulphite 12% Groundwood	100% to Boiler	"Pulp quality raised materially," say Mill Officials.
...0" diam., ...ng	16	6	670 lbs.	770 lbs.	3 to 4	9½		60% Sulphite 40% Groundwood	Bark to Incinerator	Booster pump for winter barking has recently been installed.
...8" diam., ...ng	Auxiliary to drums	6	750 lbs.	750 lbs.	3			Groundwood, Unbleached Sulphite	100% to Boiler	Streambarker barks wood which other barkers cannot efficiently handle.
...8" diam., ...ng	24	6⅔	780 lbs.	780 lbs.	4	9	7	100% Sulphite	100% to Boiler	Streambarker is first full-scale barker this mill has installed.
...8" diam., ...ng	17	6½	635 lbs.	635 lbs.	7 incl. unload, loading	9	7½	100% Soda	Bark to Dump	One of 1st Streambarker installations—yet low maintenance right along.
...0" diam., ...ng	16	6⅔	750 lbs.	750 lbs.	4	10	7	100% Sulphite	100% to Boiler	"We've eliminated knot boring, hand-cleaning, etc.," state Officials.
...0" diam., ...ng	24	7	650 lbs.	750 lbs.	3	9½	6½	50% Sulphite 50% Groundwood	⅔ to Boiler, ⅓ to Dump	Streambarker cleans logs that cannot be cleaned by other barkers.
...0" diam., ...ng	8	6	675 lbs.	675 lbs.	5	10	6½	100% Soda	100% to Incinerator	"Barker operation and capacity both very good," say Mill Officials.
...0" diam., ...ng	16	6	675 lbs.	675 lbs.	4	10	9½	50% Sulphite 50% Groundwood	100% to Boiler	Booster pump being installed to raise pressure to 775 pounds.

PREPARATION—Hydraulic Barkers, Chip Screens, Saws, Slashers, Grinders.

COOKING—Digesters, Blow Tanks, Kilns, Heat Exchangers, Condensers.

WET ROOM — Vibrating Screens for use as Thickeners, dewatering rejects, etc.

PAPER-MAKING — special drives for Paper Machines, Rewinders, Calenders.

POWER — all types of Power Generation, Distribution and Control.

MOTORS and control — all types a-c and d-c, 1 to 7000 hp — Gearmotors.

TEXROPE V-belt drives — fractional to 5000 hp — constant and adjustable.

PUMPS—Single and Multi-Stage, 10 to 150,000 gpm — Paper Stock Pumps.

closed by the Board of Trade returns for the first two months of the present year, the total for which was 153,112 tons compared with 327,306 tons the average for two months of 1938. The relative figures for the imports of paper were 48,871 tons and 178,451 tons. Exports, however, are very gradually creeping up. During the first two months of this year British exports of paper and board total 10,330 tons against 29,407 tons for two months of 1938. It is noticed that the first few tons of esparto grass are appearing on the imports of material return and in this respect it is announced from Africa that probably 60,000 tons will be shipped this year. A modest beginning but a long way short of the prewar 350,000 tons.

This small amount of esparto grass is being reserved for the present for the manufacture of papers intended for export. The standard of papers for home consumption still carry their wartime appearance. Low color and dirt predominate, although here and there some exceptionally fine papers appear but such is the demand for paper that complaints concerning the low standard of present day papers are never heard.

◆

NAT'L GEOGRAPHIC SOCIETY BUYS CONTROLLING STOCK IN CHAMPION-INTERNATIONAL

A release from National Geographic Society, Washington, D. C., on May 23 announced that the Society has purchased a majority of the stock of the Champion - International Company, Lawrence, Massachusetts. It was stated that management and operating policies will continue as heretofore.

It was further brought out in the announcement that for the past thirty-four years, the Champion-International Company has supplied all of the coated paper for *National Geographic Magazine*. The monthly edition distributed to the Society's members throughout the United States, now requires about 40 per cent of the company's annual output.

◆

HUDSON FALLS PLANT OF UNITED WALLPAPER SOLD

The Standard Division of the United Wallpaper Factories, Inc., Hudson Falls, New York, has been purchased by Henry Karlin, of Saratoga Springs, New York. Mr. Karlin, who is president and owner of the Schuylerville Wallpaper Company, Inc., at Schuylerville, New York, states that repairs and changes will be made in the plant and that it will begin operations as soon as possible. Twenty printing units will be installed as soon as they are available. It is expected that the plant will employ between 300 and 400 people.

The manufacturing activities of United Wallpaper Factories, Inc., have been moved to Aurora, Illinois (Cf. P.I. & P.W., March, 1946, p. 1748).

◆

CHINESE TECHNICIANS PAY VISIT TO MARATHON PLANT AND FOREST PRODS. LAB.

A group of Chinese forestry technicians who visited the plant of Marathon Corporation at Rothschild, Wisconsin, early in May, were fascinated by the mill's waste liquor recovery system.

The group consisted of thirteen individuals chosen by the Chinese government for a year of study of wood-using industries in the United States. They spent several days at Madison (Wis.) studying the operations of the Forest Products Laboratory there and they were highly pleased with their contact with the university students.

Next July the visitors will return to China with the ideas they have gained, and they will then attempt to use this knowledge in their own industries.

In lighter vein, published comments were that the Chinese technicians liked our chop suey, which they regard as American. They do not care for mashed potatoes, but did express a strong liking for pork chops.

◆

MEAD CORP. WILL SPEND FOUR TO FIVE MILLION AT CHILLICOTHE PLANT

Speaking before members of the Mead Foremen's Club, George Mead, chairman of the board of The Mead Corporation, announced that between $4,000,000 and $5,000,000 will be spent in the near future on the development of the Chillicothe plant. The program covers the improvement and complete modernization of paper machines and the consolidation of the two pulp mills into one large unit.

Included in the plan is the expansion of power and water supplies and distribution. The improvements at Chillicothe are part of a $15,000,000 expenditure for the postwar program of the corporation.

◆

K-C TO MAKE CREPED WADDING IN ABOUT A YEAR AT NEW SOUTHERN PLANT

In about a year Kimberly-Clark Corporation, Neenah, Wisconsin, expects to start production of creped wadding at the company's recently acquired plant at Memphis, Tennessee (Cf. P.I. & P.W. March, 1946, p. 1746).

The new plant—with 700,000 square feet of floor space—ranks with Niagara Falls as the company's largest plant. The administration building of the plant will be used as a converting department for sanitary products; the manufacturing buildings will house equipment, and the original office structure will be used for offices. H. G. Boon, K-C vice president in charge of operations, reports that two machines, plus Kleenex and Kotex converting equipment are scheduled for first installation.

The layout of the plant includes a cafeteria and locker building, a power house, and train shed.

◆

NEW CORPORATION ACQUIRES CLAREMONT PAPER CO. PLANT

The Claremont Paper Corporation, a new company, has acquired the paper mill formerly operated by the Claremont Paper Company, Claremont, New Hampshire.

William K. Kirn, Sr., will continue as president of the new corporation. The other officers are: R. B. Gerard, New York City, treasurer; James H. Molloy, Philadelphia, vice president; John D. Wilson, New York City, vice president. In addition to the officers, the board of directors includes Dudley W. Orr, Concord, New Hampshire.

◆

WEYERHAEUSER PLANS FOR MODERNIZATION AT LONGVIEW GIVEN APPROVAL BY CPA

Final approval has been granted by the Civilian Production Administration for the modernization program first announced by Weyerhaeuser Timber Company, Longview, Washington (Cf. P.I. & P. W. Sept., 1946).

Construction work actually has been started.

Only a short time ago Weyerhaeuser received CPA approval for other improvements at Longview, including a plywood mill to cost nearly $1,000,000.

◆

APPROVAL TO PROCEED WITH PLASTICS PLANT GRANTED CELANESE CORP.

The application of Celanese Corporation of America to build an addition to its plastics plant at Belvidere, New Jersey, has been approved by the Civilian Products Administration, according to a recent announcement by the company.

It is planned to produce both cellulose acetate and cellulose proprion-

Dear Ted:

You needn't worry about your job, Sergeant. Things are humming at the mill, as you can see from this picture—taken three months *after* V-J.

We're turning out a better quality paper, for one thing. No more dark spots or speckles. What's the secret? Well, it's hardly that. Permutit* Water Conditioning . . . removes dirt, iron and other impurities from incoming process water. You'd be surprised how this can improve paper stock—and, of course, your stock with the trade.

But we didn't stop with Permutit water *treatment*. The mill has installed one of Permutit's White Water Reclaimers which enables us to recover a high percentage of filler, save chemicals, re-use process water, and reduce stream pollution. So you see, while we're as busy as ever, we're operating more efficiently—thanks to Permutit.

* * *

For information about economical Permutit equipment for paper mill water treatment, write to The Permutit Company, Dept. PI6, 330 West 42nd St., New York 18, N. Y. or Permutit Co. of Canada, Ltd., Montreal.

*Trademark Reg. U. S. Pat. Off.

PERMUTIT

WATER CONDITIONING

ate molding material in the new unit. Demolition of the old smokeless powder buildings and magazines operated during the war is already under way preliminary to breaking ground for the new plant about July 1.

◆

▶▶▶ THE CPA OFFICE has approved the construction of the addition to the Nashua Gummed and Coated Paper Company plant at Nashua, New Hampshire, which was announced some time ago as one of the improvements planned by the company. The building will cost around $275,000, and will afford employment for 250 additional men.

◆

FINANCIAL

With stock market prices rising to high figures unprecedented for years, paper mill securities followed the trend, and even the four day recession beginning April 20 did not depress quotations below those generally prevalent a month previous.

Bird & Son, Inc.—Net income in 1945 was $694,037 as against $786,572 in 1944.

Brown Company—Net profit for the fiscal year ended November 30, 1945, was $1,219,808 as against $1,298,244 the previous year.

Champion Paper & Fibre Company—Net income for twelve weeks ended February 3, 1946, was $286,469 as against $429,181 a year ago.

Chemical Paper Manufacturing Company—Net profit in 1945 was $108,890 as against $111,123 in 1944.

Container Corporation of America—Net income for three months ended March 31, 1946, was $1,032,787 as against $479,045, for the same period a year ago.

Continental Diamond Fibre Company—Net income in 1945 was $345,813 as against $380,118 in 1944.

Crocker-McElwain Company—Net profit in 1945 was $97,593 as against $112,522 in 1944.

Crown Zellerbach Corporation—Net profit for nine months ended January 31, 1946, was $5,706,189 as against $5,399,620 for the same period in the previous fiscal year.

Robert Gair Company—Net earnings for the quarter ended March 31, 1946, were $407,095 as against $205,830 for the same quarter in 1945. The company, together with the Fort Wayne Corrugated Paper Company have invested $12,000,000 in the formation of the Southern Paperboard Company, which will build near Savannah, Georgia.

Gaylord Container Corporation—A proposal for a split of common stock at the rate of three new shares for each share of old, will be voted upon by the stockholders. Each share of preferred, now convertible to two of common, will be convertible into six shares of common.

Hinde & Dauch Paper Company—Net income for 1945 was $999,067 as against $960,255 in 1944.

Hummel-Ross Fibre Corporation—Net income for the first twelve weeks of 1946 was $153,439 as against $82,042 a year ago.

International Paper Company—Net profit in 1945 was $8,546,078 as compared with $8,477,953 for the previous year.

Keyes Fibre Company—An underwriting group has offered $2,800,000 first mortgage 3¼% bonds to provide funds for retirement of present 4¼% bonds and the balance for a new plant at Hammond, Indiana.

Kimberly-Clark Corporation—Net income for 1945 was $1,985,691 as against $1,853,916 in 1944.

Mead Corporation—Net income for twelve weeks ended March 23, 1946, was $574,490 as against $247,120 for the comparable period a year ago.

Minnesota & Ontario Paper Company—Net income in 1945 was $1,549,042 as compared with $1,125,287 in 1944.

National Container Corporation—Net profit in 1945 was $1,185,912 as against $1,190,991 in 1944.

Nekoosa-Edwards Paper Company—Net income for 1945 was $421,153 as against $494,371 for the previous year.

Paraffine Companies—Net loss for the quarter ended March 31, 1946, was $614,311 as against a profit of $479,473 for the same quarter in 1945. Net loss for nine months ended March 31, 1946, was $530,505 as against a profit the year before of $1,500,263.

Rayonier, Inc.—Net profit for nine months ended January 31, 1946, was $3,342,189 as against $4,386,617 for the corresponding period the previous fiscal year.

St. Croix Paper Company — Net profit for 1945 was $71,780.

St. Regis Paper Company—President Roy K. Ferguson told the annual meeting of stockholders that expansion plans include a $10,000,000 kraft plant in the South, and while this program is under way, there is no prospect of inaugurating dividend payments.

Scott Paper Company—Consolidated net earnings for the three months ended March 30, 1946 (after proyision for preferred dividends), were $410,564 compared with $315,493 for the corresponding period ended March 31, 1945.

Sutherland Paper Company — Net profit for the first three months in 1946 was $302,397 as against $140,429 for the same quarter in 1945.

Union Bag & Paper Company—Net earnings for 1945 were $1,646,467 as against $1,584,013 in 1944.

United Paperboard Company—Net income from June 1, 1945 to March 9, 1946, was $71,807.

United States Envelope Company—Net profit for 1945 was $819,193.

United Wallpaper, Inc.—Net income for the first half of the fiscal year ended December 31, 1945, was $292,652. An expansion program is in prospect and the company proposes the issue of $2,000,000 in 3% notes, the redemption of $700,000 outstanding preference stock and the sale of 40,000 shares of cumulative convertible preferred stock, with a dividend rate of not over 4½%.

New York Stock Exchange—Stocks

	Closing Prices April 25	March 25
A.P.W. Products ..	9⅜	9⅛
Celotex	29	28¼
Same Preferred..	21⅜	21⅜
Certain-teed Prod...	21⅜	19
Same Preferred..	...	*110½-115
Champion P&F Co.	60	*48½-50
Same Preferred..	111½	*111-111½
Container Corp. ...	50¾	45¼
Cont. Diamond ...	15¼	16
Crown Zellerbach .	36	36
Same Preferred.	*108-108¾	108
Same $4 Pref..	*132-142	125
Dixie Vortex	51	45
Same "A"	56¼	52¾
Robert Gair	9⅞	10¾
Same Preferred..	20¾	20½
Gaylord Container.	57	58¼
Same Preferred.	*110-115	115
International Paper.	50⅜	45½
Same Preferred..	125	115
Kimberly Clark ...	*65-66	*60¼-62½
McAndrews & Forbes	41⅞	*37½-38½
Masonite	72½	61
Mead Corp.	28⅛	26⅜
Same Preferred.	*105-108	*105½-106
National Container.	33⅞	28¼
Paraffine Cos.	90⅛	78¼
Same Preferred..	109½	110
Rayonier	26¾	26¼
Same Preferred..	37⅛	36⅛
Scott Paper	55	58
Same 4½% Pref. ...		*108-109
Same 4% Pref...	...	*107½-108½
Sutherland Paper .	50	43½
Union Bag & P....	35¼	31¼
U. S. Gypsum.....	123	125
Same Preferred..	204	204
West Va. P&P....	48	41½
Same Preferred..	115	114

New York Stock Exchange—Bonds

Abitibi 4%	...	108½
Celotex 3¾%	...	...
Certain-teed 5½%	...	...
Cham. P&F Co. 3%	105¼	...
Intl. Paper 5%....	102⅛	102¼
Same 6%	...	...

New York Curb Exchange—Stocks

Am. Writing	111¼	10½
Great Northern ...	42	39¼
Hummel Ross	17¼	12⅞
St. Regis	11⅜	10⅞
Taggart	9⅛	9
United Wall Paper.	10⅛	11

*Closing Bid and Asked Prices.

BRIEFS

▶▶▶ THE MILL OF the Warrensburg Pulp and Paper Company, Warrensburg, New York, is being changed over to make kraft stock instead of the paper it has made for the past three years. It is expected that during the summer an additional mill will be erected and another paper machine installed. Isador Baum, of New York City, is president of the corporation.

◆

▶▶▶ AN ADDITIONAL STUMPAGE TAX of 15 cents will be payable by all holders of timber limits in the Province from which wood is destined for the manufacture of pulp and paper or the accessory products of pulp. This tax was passed recently by the Quebec Legislature. Earmarked for the education fund, the new tax is expected to yield $750,000 annually.

◆

▶▶▶ THE GATINEAU (Quebec) mill of Canadian International Paper Company is being extended by the addition of facilities for bleaching sulphite pulp. On completion, the mill will be able to produce either dissolving pulp or bleached or unbleached paper pulp, as the market requires.

◆

▶▶▶ IN EXCHANGE FOR the right to cut $223,922 worth of timber on the Big and Little Sandy Rivers, near Portland, Oregon, Crown Zellerbach Corporation has released 2,400 acres of land near Mount Hood, Oregon, to the Forest Service. Negotiations in the matter have been under way for about 25 years.

◆

▶▶▶ WASHINGTON was interested in the action taken in Canada, paralleling American decisions, to allow increases in ceilings on various grades, particularly in the domestic use of newsprint. This action across the border is taken as indication that the supply and demand situation, coupled with price developments, is approaching stabilization.

◆

▶▶▶ A LONG TERM LEASE on the Greenwalt Industries Building at Springfield, Ohio, has been signed by the United Paperboard Company, New York City. A mill and carton plant now in operation at Urbana, Ohio, will be transferred to Springfield and the capacity tripled, according to H. W.

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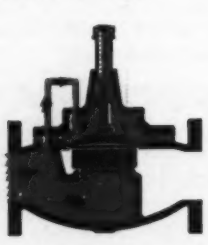

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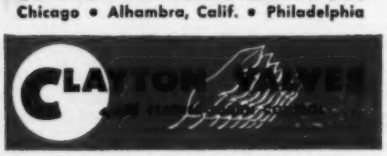


Kephard, of New York, vice president, who closed the transaction in Springfield. It is expected that operations will begin on a limited scale in Springfield by the latter part of July and increase gradually until 350 persons are employed by January 1, 1947.

◆

▶▶▶ THE SUBJECT OF "Semi-chemical Pulping" was covered by Prof. C. E. Libby, of the New York State College of Foresty, when he spoke before an evening session at the Polytechnic Institute of Brooklyn recently. Professor Libby's lecture was part of a general treatment of the subject of pulp and paper technology offered in thirty lectures. The course will again be offered during the next academic year and will be under the direction of R. S. Aries.

◆

▶▶▶ LOGGING OPERATIONS have been started by Pacific Mills, Ltd., at Beaver Cove at the northeastern section of Vancouver Island. There is approximately one billion feet of pulp logs available at Beaver Cove, which will be a truck operation. The logs will be Davis-rafted to the Ocean Falls pulp and paper mill of the company.

◆

▶▶▶ THE BUILDING PROGRAM at the West Linn (Oregon) plant of the Crown-Willamette Paper Company is proceeding according to schedule and should be completed by January, according to an announcement by C. E. Bruner, resident manager. Work is progressing on four buildings —Mill F, coating plant, bleach plant, and remodeling of Mill D.

◆

▶▶▶ THE WINDSOR LOCKS (Conn.) mill of the Groveton Papers Company, Northumberland, New Hampshire, has been sold to the newly formed Windsor Locks Paper Corporation headed by A. H. Cohen. The new company will continue to manufacture tissue.

◆

▶▶▶ THE RIGHT TO CONTINUE using the name Red Cross and such a symbol was recently upheld by the United States Supreme Court in favor of the APW Paper Company, Inc., of Albany, New York. Under a 1910 congressional act, the Federal Trade Commission, which had appealed the decision of a lower court, could not forbid use of the name and symbol to concerns which used them before 1905. The APW company had been using the name Red Cross and the symbol on its packaged products since before 1897.

▶▶▶ A MAJOR INTEREST in the Victoria Paper Mills Company, of Fulton, New York, has been purchased by J. S. Hartman, president of Barclay Tissue Corporation and Tissue Association, Inc. There will be no change of name or in company policy, but plans are under way for plant expansion. B. I. Reider, who has been vice president and treasurer of the Victoria company, has been elected president and general manager.

◆

▶▶▶ MILL WASTE from the Canadian White Pine Company, Ltd., will hereafter be supplied to the pulp and paper industry in chip form. The company states it will discontinue making sawdust.

◆

▶▶▶ APPROVAL has been granted by the Portland, Oregon, office of the Civilian Production Administration, for a $55,000 addition to the plant of the Western Paper Converting Company, of Salem, Oregon.

◆

▶▶▶ A NEW WALLPAPER plant may be built at Appleton, Wisconsin, by the United Wallpaper Company, Wilmington, Delaware. The plant would be operated by the Kimberly-Clark Corporation, Neenah, Wisconsin, according to present plans. United Wallpaper Company now takes the entire production of the Atlas mill of Kimberly-Clark at Appleton. The estimated cost of the plant is $500,000.

◆

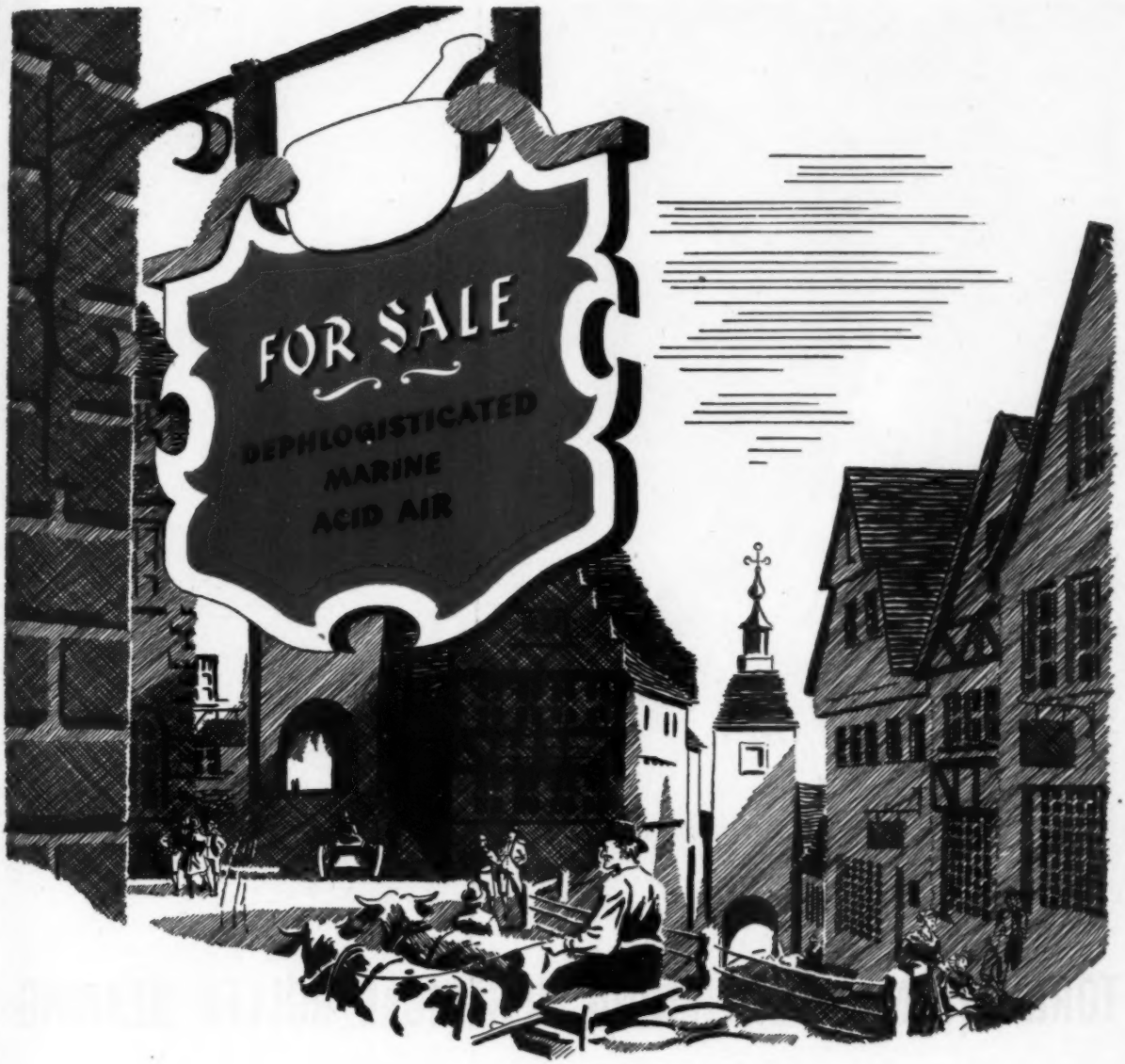
▶▶▶ THE AUTHORITIES have announced that requests for permits to import newsprint from Scandinavia will be freely granted in the future, on equal terms with Canada and Newfoundland.

◆

▶▶▶ SALE IS REPORTED of the former Rayonier, Inc., plant on the Tacoma, Washington, tideflats to the Tacoma Powdered Metals Company. The property includes 23 acres. The pulp mill was closed by Rayonier November 1, 1942 (Cf. P.I. & P.W. Nov., 1942), following government order restricting operation of pulp mills on Puget Sound. The equipment was subsequently sold to The Bagley & Sewall Company, Watertown, New York, and removed from the property.

◆

▶▶▶ ON MAY 1, prices on Canadian newsprint were increased by $9 per ton by Wartime Prices and Trade Board suspension of price ceilings. The current price of $67 per ton f.o.b. New York, represents a 34 per cent increase over the $50 price on January, 1, 1938.



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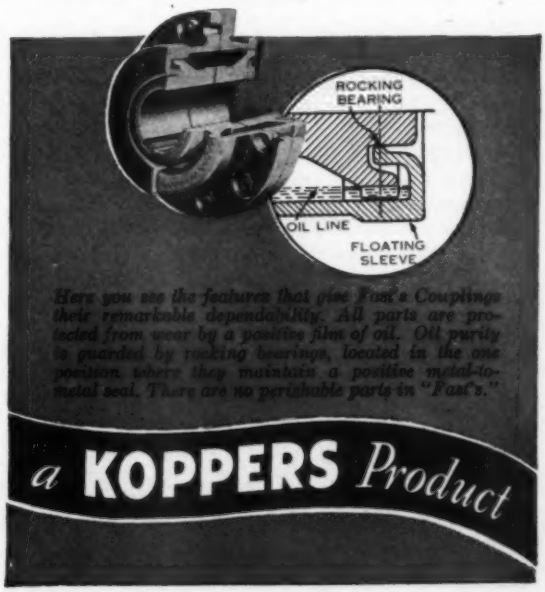
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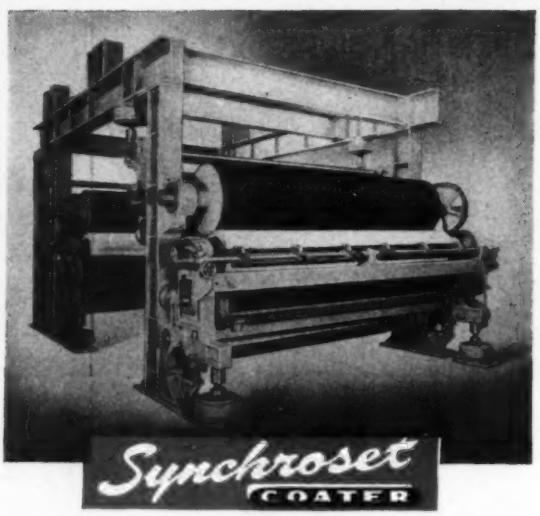

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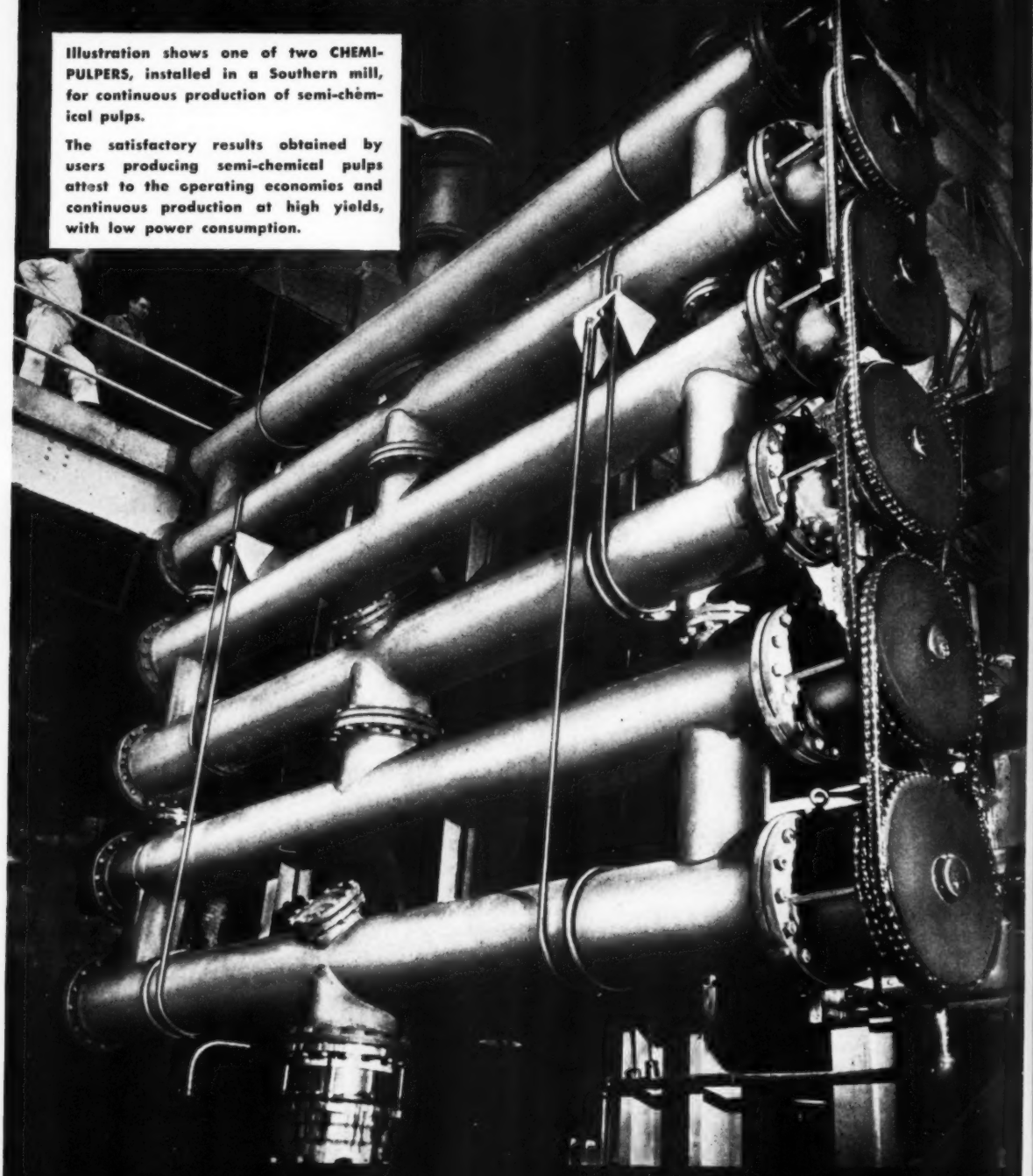

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Crystallizing Point	Approximately —37°C. (—35°F.)
Viscosity at 25°C.	2.18 Centipoises
pH Anhydrous	7.0
pH 10% solution in distilled water	4.2

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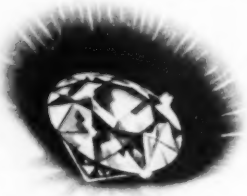

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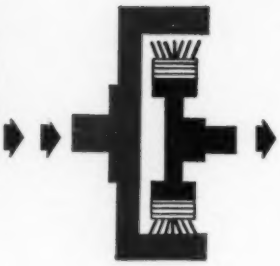
THE MODERN

Answer



To These Drive Problems··· *Calling for Adjustable Speed Control*

Today's answer in getting economical, adjustable-speed control for boiler draft fans, centrifugal pumps and centrifugal compressors is the E-M Adjustable-Speed *Magnetic Drive.*

The Magnetic Drive is a simple, compact electro-magnetic torque transmitter. It is installed between a squirrel-cage or synchronous motor and the driven equipment, and operates in combination with an electronic controller to maintain selected speed regardless of changes in load. The Magnetic Drive requires no fluids; is simple, rugged and clean; provides precise, micro-step speed control over a wide range with immediate response to load requirements.

Boiler draft fans are the outstanding application for Magnetic Drives, but the inherent features of the unit are also highly advantageous on all applications characterized by a load torque which drops off rapidly with reduction in speed, such as centrifugal pumps, centrifugal compressors and blowers.

Write now for Publication No. 183, describing E-M Magnetic Drive construction, operation and advantages.

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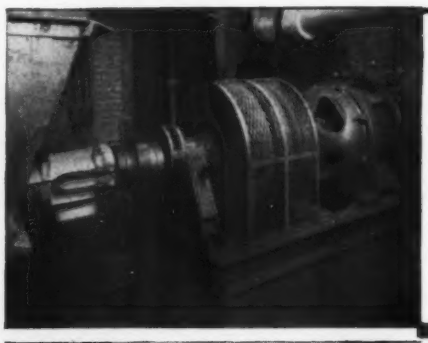
MAGNETIC DRIVES

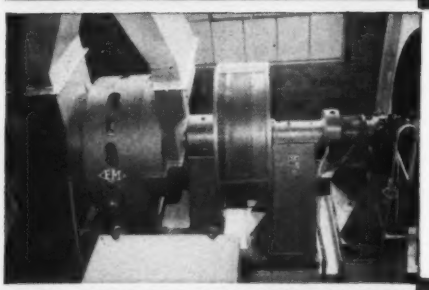
PRECISE, WIDE-RANGE, QUICK-RESPONSE SPEED CONTROL A2034



Answer 1

INDUCED DRAFT FANS

Wide-range, precise boiler draft control on an induced draft fan at a New Jersey paperboard company was provided when this 100 hp, 870/87 rpm, E-M Magnetic Drive unit replaced a slip-ring induction motor previously used.



Answer 2

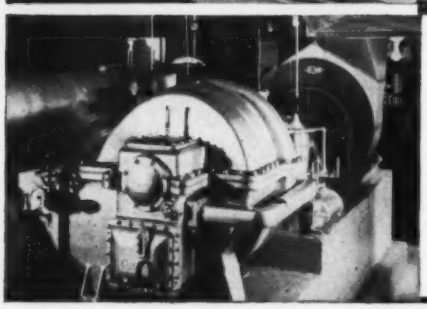
FORCED DRAFT FANS

Quick-response, adjustable speed control of forced draft fan at an Ohio power plant is provided by this 322 hp, 1145/280 rpm E-M Synchronous Motor-Magnetic Drive set. Induced draft fan also uses an E-M Magnetic Drive.

Answer 3

CENTRIFUGAL PUMPS

Two 40 hp, 1707/1056 rpm, E-M Magnetic Drives in a Wisconsin paper mill drive black liquor centrifugal pumps feeding boilers. Magnetic Drive is a compact unit installed between motor and pump to control fluid delivery rate.



Answer 4

CENTRIFUGAL COMPRESSORS

Close-regulated, adjustable speed to suit refrigeration requirements for air conditioning in a Florida mercantile building is provided on this centrifugal compressor by an E-M 350 hp, 1150/840 rpm Magnetic Drive.

Interesting Facts About Paper

Paper sheets, greenish in color and chemically treated, were a means of warning our soldiers of the presence of gas in combat areas. The paper sheets were worn on the arm, tacked to a fence, stuck on the end of a bayonet, or put any other place where they would be easily seen.

Interesting Facts About Helmerco Blues

Helmerco Blues comprise an interesting group of tinting pigments known to papermakers everywhere for the blue-white perfection they bring to white bond, writing, book, ledger and other papers at minimum color cost.

Helmerco Blues are excellent performers in any furnish and are dependably uniform. Added directly to the beater, Helmerco Blues disperse rapidly, giving a broad range of quality white shades with good light fastness and excellent brightness. Fine light blues in the same group of papers can also be produced with Helmerco Blues, as well as fast-to-light specialty shades.

Consult your Heller & Merz representative for complete information on Helmerco Blues.

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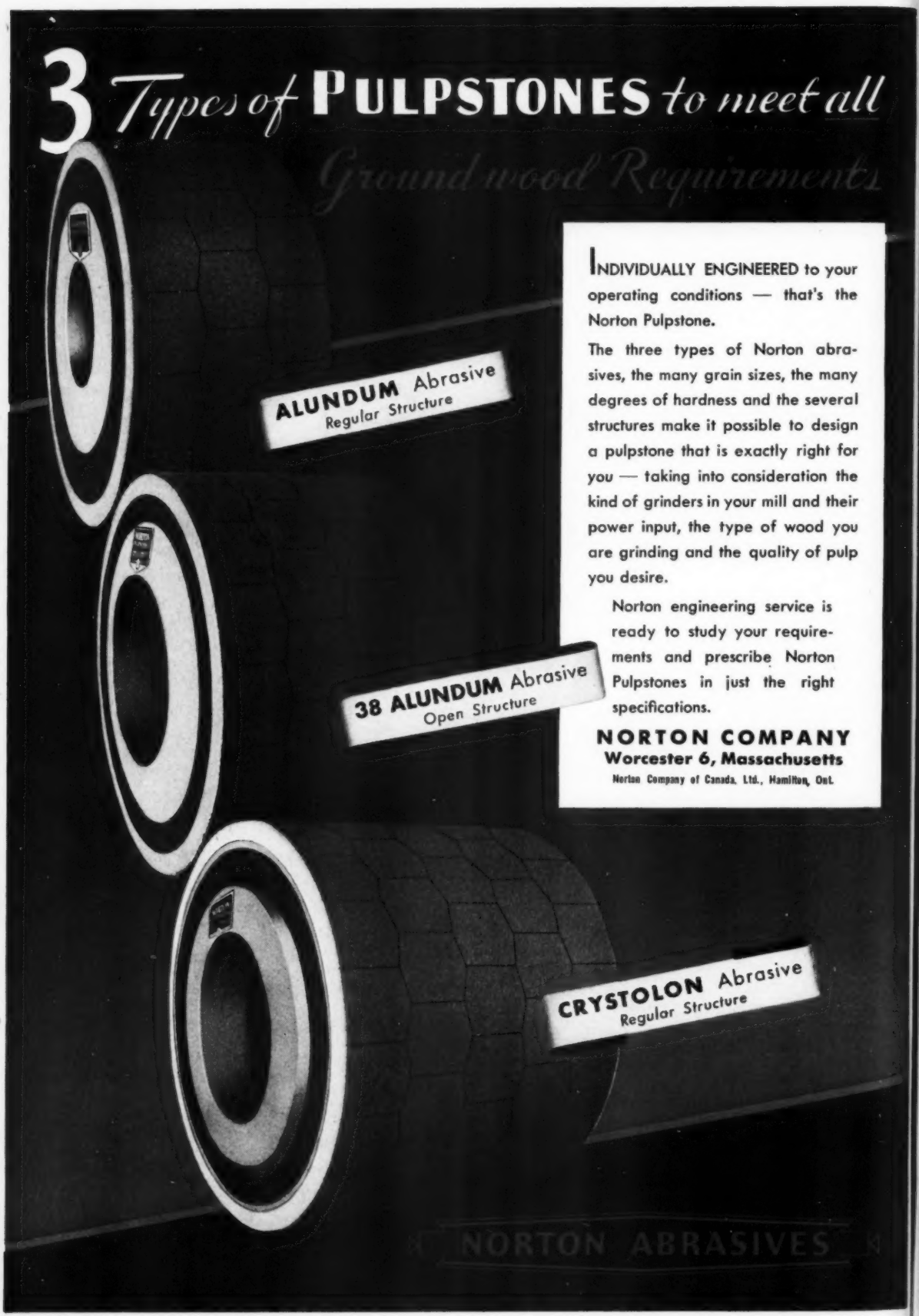
3 Types of PULPSTONES to meet all Ground wood Requirements



INDIVIDUALLY ENGINEERED to your operating conditions — that's the Norton Pulpstone.

The three types of Norton abrasives, the many grain sizes, the many degrees of hardness and the several structures make it possible to design a pulpstone that is exactly right for you — taking into consideration the kind of grinders in your mill and their power input, the type of wood you are grinding and the quality of pulp you desire.

Norton engineering service is ready to study your requirements and prescribe Norton Pulpstones in just the right specifications.

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STAINLESS STEEL PIPE FITTINGS by *Esco*

ESCO stainless steel pipe fittings are made of the same Esco alloy 45 that is used with such good results in pulp mills throughout the United States and Canada. Teamed with Esco stainless pipe, they resist corrosion and reduce piping maintenance to the minimum.

Esco screwed pipe fittings are available in sizes from 1/8" to 3"—in 90- and 45-degree elbows, tee, cross, union, coupling, reducer, cap, plug, bushing and locknut. Complete range of sizes are carried in warehouse stock.

Esco flanged pipe fittings range in size from 1/2" to 10". Available in 90- and 45-degree elbows, tee, long radius ell, 45-degree lateral, and reducer. Faces are accurately machined to insure perfect gasket seat.

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The material in a valve must suit the service, POWELL *has all kinds!*

100 YEARS in the School of Experience has taught us many valuable lessons. Not the least of these is the importance of using the *right* valve in the *right* place. Not only type and design but *material* as well must be "just what the doctor ordered."

It is poor economy to use iron when steel is definitely indicated. On the other hand, if iron is thoroughly adequate for the job, there's no sense in using a more expensive material.

The POWELL lines of Iron and Steel Valves are so complete that there's a valve of correct type, size, and design for every service in which these valves are applicable. Equally complete lines of Bronze Valves and Valves to resist all known corrosive media are included in the Complete POWELL Line. The latter are made in the widest range of pure metals and special alloys ever used in making valves. POWELL Engineers are always ready to help you select the right valves.

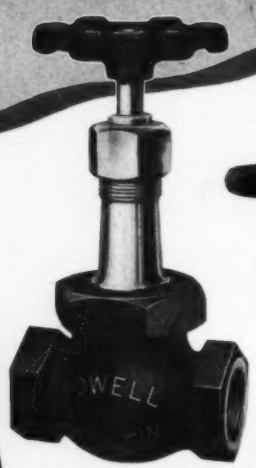

Fig. 190

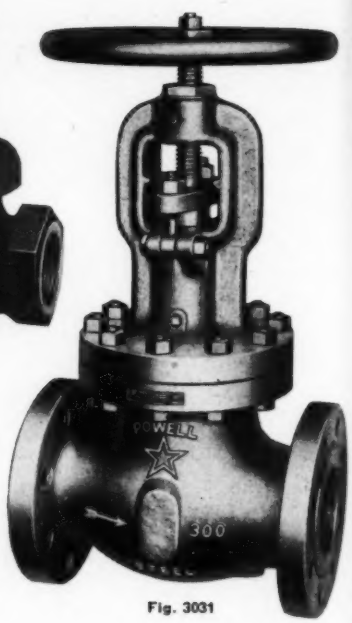

Fig. 3031

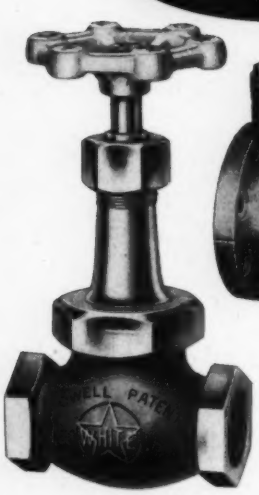

Fig. 1708

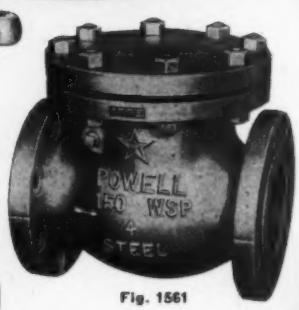

Fig. 1561

Catalogs on Request. Kindly specify whether you are interested in Bronze and Iron; Cast Steel; or Corrosion Resistant Valves.

Fig. 241

Fig. 1708—200-pound Bronze Globe Valve with union bonnet, renewable seat and regrindable, renewable, wear-resisting "Powellium" seat and disc.

Fig. 1561—Class 150-pound Cast Steel Swing Check Valve with flanged ends and bolted cap. Disc, when wide open, permits full unobstructed flow through the valve body.

Fig. 241—125-pound Iron Body Bronze Mounted Globe Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke and regrindable, renewable bronze seat and disc. Also available in All Iron for process lines.

Fig. 190—150-pound Iron Body Bronze Mounted "Irenew" Globe Valve. Has screwed ends, union bonnet and regrindable, renewable wear-resisting "Powellium" seat and disc. Also available in All Iron for process lines.

Fig. 3031—Class 300-pound Cast Steel Globe Valve with flanged ends, outside screw rising stem and bolted flanged yoke.

The Wm. Powell Company, Cincinnati 22, Ohio

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EDITORIAL

We Need More Pulp Production

▶▶▶ THE WOES AND WAILS of the paper consumers for more paper are many and loud. They are justified, too, for the situation is so unexpectedly tight and paper tonnage is so universally scarce that it will result in a panic paper market this year. The tragedy of the situation lies in the fact that neither paper producers, converters, distributors nor consumers are aware of nor alert to the extent of the menace to their operations. But they will be very shortly.

The plain facts of the case are that there has been developing for the past five years a prodigious demand for paper products which is now manifest in an unprecedented shortage of supplies.

In 1941, we reached the peak production and consumption year in the history of the industry. The following table of 1941 contrasted with 1945 discloses the production performance:

Tons	1941	1945	Tons Decrease
Production ...	17,762,365	17,374,208	388,157
Net imports ..	2,655,823	2,448,245	207,578
Consumption .	20,418,188	19,822,453	595,735

This means that in the four years following 1941, while the industry was submerged beneath the greatest volume of tonnage demand ever known, we did not increase our production, but on the contrary, ended the four-year period with a production and consumption loss of 595,753 tons. And yet, a year after V-E Day, and nine months after V-J Day, we are still submerged beneath a greater volume of tonnage than we had during the peak of the war demand. Consumers want more paper, and the industry is producing less. Manifestly, someone is going to be critically short of supplies.

The seriousness of this situation is being appreciated by a few of the smart and alive tonnage users and paper converters, who, since V-J Day, have bought outright some thirty different mills, thus taking the product of those mills out of the general market. The combined tonnage of the mills so far transferred is over 3,000 tons a day.

There is no better evidence needed to convince any skeptic as to the shortage of paper tonnage than this unprecedented purchase of that number of mills in so short a time by needy consumers of paper.

As each of these mills was transferred, hundreds of consuming customers were deprived of their sources of supply, and, when they turned to the market, not a ton of paper was available. These situations are becoming a weekly event. So, when a survey of the facts upon which the future operations of industry will turn discloses that we have a potential demand for 25,000,000 tons of paper products today and a production last year of but 17,374,208 tons, plus imports of 2,448,245 tons with which to meet it, the situation becomes clear that we are behind the 8 ball by five to six million tons.

One of our large paper mill executives recently said: "The demand is so great, especially for kraft papers, kraft board and rayon pulp that additional capacity is urgently needed."

Too true! The need for all grades of paper demands additional capacity. There are today new mill projects *still on paper* aggregating about 400,000 tons per year (or about 1,200 tons per day), but practically none of that projected tonnage will come into production until the spring of 1948.

In the meantime, the demand for paper products is estimated to run about 16,000 tons a day in excess of the supply. That is equivalent to forty mills making 400 tons a day for six days every week.

We say that woes and wails of paper consumers in the country are justified, but that won't get them any paper. We need more pulp mills.

Academic Leave

▶▶▶ SABBATICAL LEAVE is an expression familiar to most people. It is particularly familiar to those who, in one way or another, have been interested in college or university work. If just by chance you are not acquainted with the term, or need a little brushing up on it, Webster defines it as "a leave of absence granted every seventh year, as to a college professor, or the like, for rest, travel, or research." In other words, it is an opportunity to recuperate, to get new life, to delve more deeply into a chosen field of study—a privilege granted, usually with full pay, to those who have filled satisfactorily and with credit a professional job for six years.

Academic leave, unlike sabbatical leave, is not in the dictionary. Yet what an apropos term it is.

It was used recently by Dr. Carroll H. Hochwalt, Director of Central Research, Monsanto Chemical Company, in addressing the National Industrial Conference Board.

Dr. Hochwalt revealed that Monsanto is inaugurating an academic leave for its industrial scientists—four leaves each year to be made on the basis of especially meritorious service and outstanding performance in scientific work carried out at any period and in any location in the service of the firm. This arrangement will enable the recipients to return to universities of their choice for an academic year of study at full salary.

The purpose behind the program—so simple and so far reaching—is to encourage the scientific work and development of technical personnel in physics, chemistry and chemical engineering.

It may be that other industrial organizations have made use of a similar plan in the past, or are doing so now; but, if so, it is not known to this editor.

Is there a pulp and paper mill organization with such a plan? It would be pleasing to learn that there is at least one and possibly more of them.

With research coming rapidly into its own in the pulp and paper industry, the need for such a refresher program is almost self-evident. No mill can afford to rest on its past laurels. If it intends to meet the competition of the future, it must prepare for it now.

What greater inducement to successful accomplishment could be given to a mill research organization than a properly scheduled academic leave for the deserving members of its staff!

"Wonders of Tomorrow".... Where Are They?

WILLIAM SIBLEY

▸▸▸ THE STARRY-EYED, high school valedictorian of 1936, with his hair slicked down, orated at length and with awkward gestures about the marvelous new world of wonders into which he and his contemporaries were just then emerging. The Buck Rogers era which was just-around-the-corner and which was predicted with such wild prophecies surely must have made Jules Verne a whirling dervish in his grave. The young prophets of ten years ago told their fathers, mothers, aunts and uncles that presently the work week would be twenty or twenty-five hours, and that we would have push button controls which do everything from walking the dog to changing the baby. Our foods were to be plentiful, concentrated, tasty, pure, and saturated with vitamins. We were to travel at speeds of a thousand miles an hour, and our death rate would be cut to something practically miscroscopic. And his parents — and practically all other parents, glowed with parental pride and agreed with him a thousand per cent.

But whoa, Jackson! Look at this world just ten years later! A hunger situation that is the worst in recorded history; or at any rate comparable to the Middle Ages. We have twelve million tons of wheat at a time when we need twenty-one million tons. The worst famine in fifty years looms in India. The malnourished children of Europe are bringing on that continent a generation of weak, disease-ridden, rickety people.

The nitrates of Europe were used for making ammunition with the result that the lack of normal applications of fertilizer has so reduced yields that average prewar agricultural production cannot be attained for seven or eight years of normal farming.

If you think (and rightly so) that our housing situation is acute here in the United States — take a gander at war-torn Europe. In Germany alone there are four million homeless, and cave- and shell-hole dwellers range from the Atlantic Coast to Stalingrad. Lean-tos, barns, and railroad cars serve as houses throughout Europe.

Here at home we are plagued with a long series of strikes, the recent steel strike alone causing a $120,000,000 wage loss. Currently, the coal strike is bringing about a situation which can well be more than dangerous — but catastrophic. Our social engineering has fallen far behind our mechanical techniques. As Donald Richberg said: "Things seem to be run today by young men in a hurry or old men in a panic."

Although the green light has been given for construction of houses for veterans, basic materials are short, largely due to OPA restrictions. The program of the American Road Builders Association for the rehabilitation of present highways, and the building of new arterial thoroughfares and airports, is bogged down because of the scarcity of machinery. The ban that exists on much construction is delaying our return to prosperity. A steel plant is not permitted to build a new plant. A public utility may expand its service facilities but it cannot build itself an office building. Never has there been such a need to buy things; never has money been so cheap; never has private savings been so high — yet here we are, living in cramped quarters, working under restrictive operating conditions, largely refused permission to buy — or sell. What ho! my young prophet of ten years ago. All the foregoing makes these times deadly serious. But all the more so since Russia is rapidly coming to the front mechanically and industrially. True — she is far, far behind us as of now. Without American-made munitions she would have fallen prey to Germany—even the Russians admit that fact. But while our own progress has been and is being held down by legislative restrictions, strikes and labor disputes, Russia is forging ahead at top speed. Here are a few interesting figures:

Back in 1938, Russia had 902 scientific institutions with a staff of over 80,000 persons. In that year she appropriated one billion rubles for scientific research, as against 1,500,000 rubles in 1917. What is the extent of her present day research no one outside of Russia knows—and she isn't telling.

During the past twenty-five years, the number of universities in Russia has increased from 91 to 716, with a present-day enrollment of well over 600,000. Among the many fundamental discoveries to which she lays claim is butadiene, the foundation upon which the synthetic rubber industry is built.

Since the war, the Great Bear has turned beaver-like in industry and is building many new industries and expanding others. Her most pronounced efforts have been in developing both ferrous and non-ferrous metals, coal, machinery, rolling stock for railroads, automotive equipment, power facilities, petroleum, timber and food products. More than thirty large new coal mines have been opened during the past fifteen months, and during 1945, construction of fourteen new plants for the manufacture of coal-mining machinery was begun.

The iron and steel combine of the South Urals shows vast new constructions. Several concentrating plants, new open hearth furnaces, smelters, coke batteries, blast furnaces, blooming mills, pipe mills, railroad and farm machinery plants—all are new, and more coming. Don't take your eyes off Russia. It isn't too early to start worrying.

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You can be sure that Chain by Link-Belt will meet every requirement of performance. Design, material, workmanship must meet rigorous operating tests before the chain is permitted to become a part of your installation. Built to the highest standard of quality . . . and tested to meet these standards . . . Chain by Link-Belt will give you trouble-free service throughout the years.

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"SS" Class Short Pitch. For medium and heavy duty drives; made with offset or straight side bars; with or without bushings or rollers.

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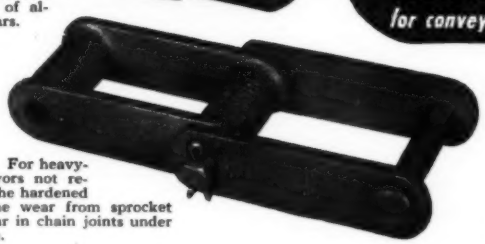

"SS" Class Without Rollers. For heavy-duty elevators and conveyors not requiring roller type chain. The hardened steel bushings minimize the wear from sprocket tooth action, and resist wear in chain joints under gritty and abrasive service.

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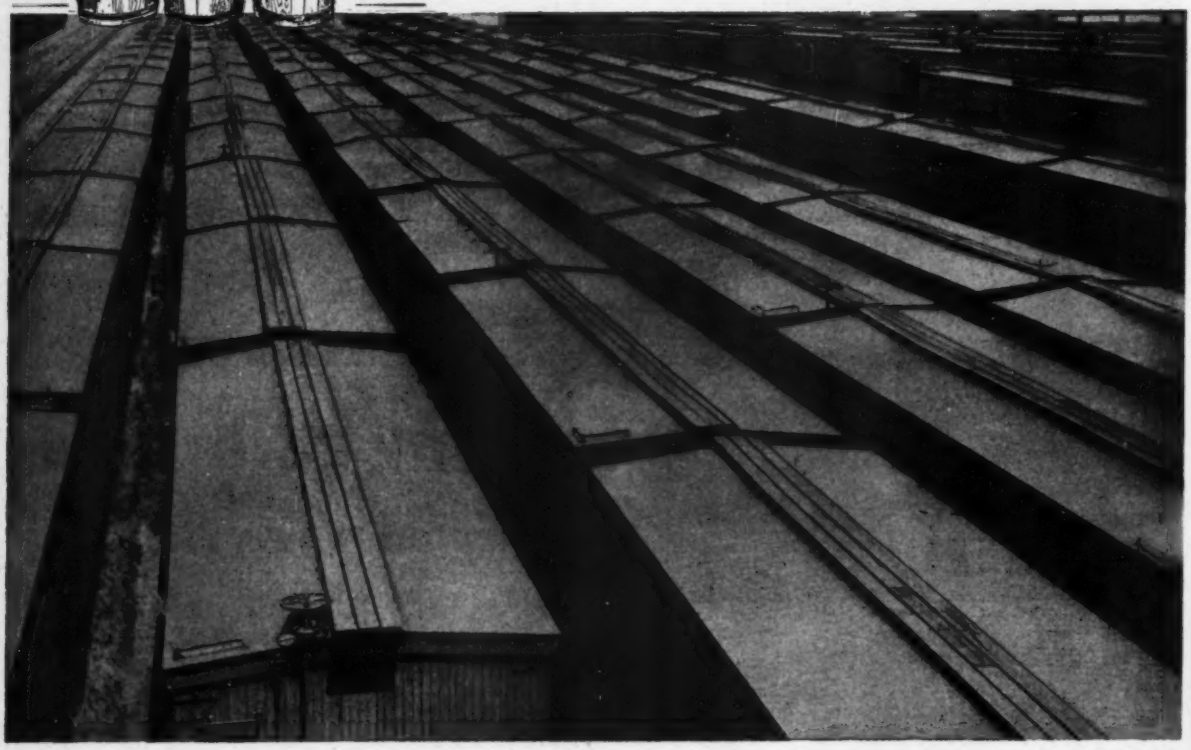
TITANOX... *the brightest name in titanium pigments*

BARRELS TO BOXCARS



In 1914, four barrels of Titanox-B were made and shipped from a pilot plant in Niagara Falls, New York. This was the first production run of titanium barium pigment in the United States . . . and represents another "TITANIUM PIGMENT FIRST"

Today, Titanox pigments are shipped in carload quantities. The experimental plant at Niagara Falls has given way to huge factories, one at St. Louis and the other at Sayreville, N. J.

The reason for this tremendous growth is understandable when you consider the exceptional qualities that Titanox pigments impart to various products: high opacity, whiteness and brightness. These, combined with chemical inertness and extremely fine particle size, make Titanox pigments the most efficient obtainable. Always economical, they have steadily decreased in cost through the years.

Constant progress in improving industry's products with Titanox pigments has always been – and is now – a major endeavor of their producers. While maintaining quality standards, every effort is being made to produce greater quantities of Titanox pigments to meet growing needs in many fields.

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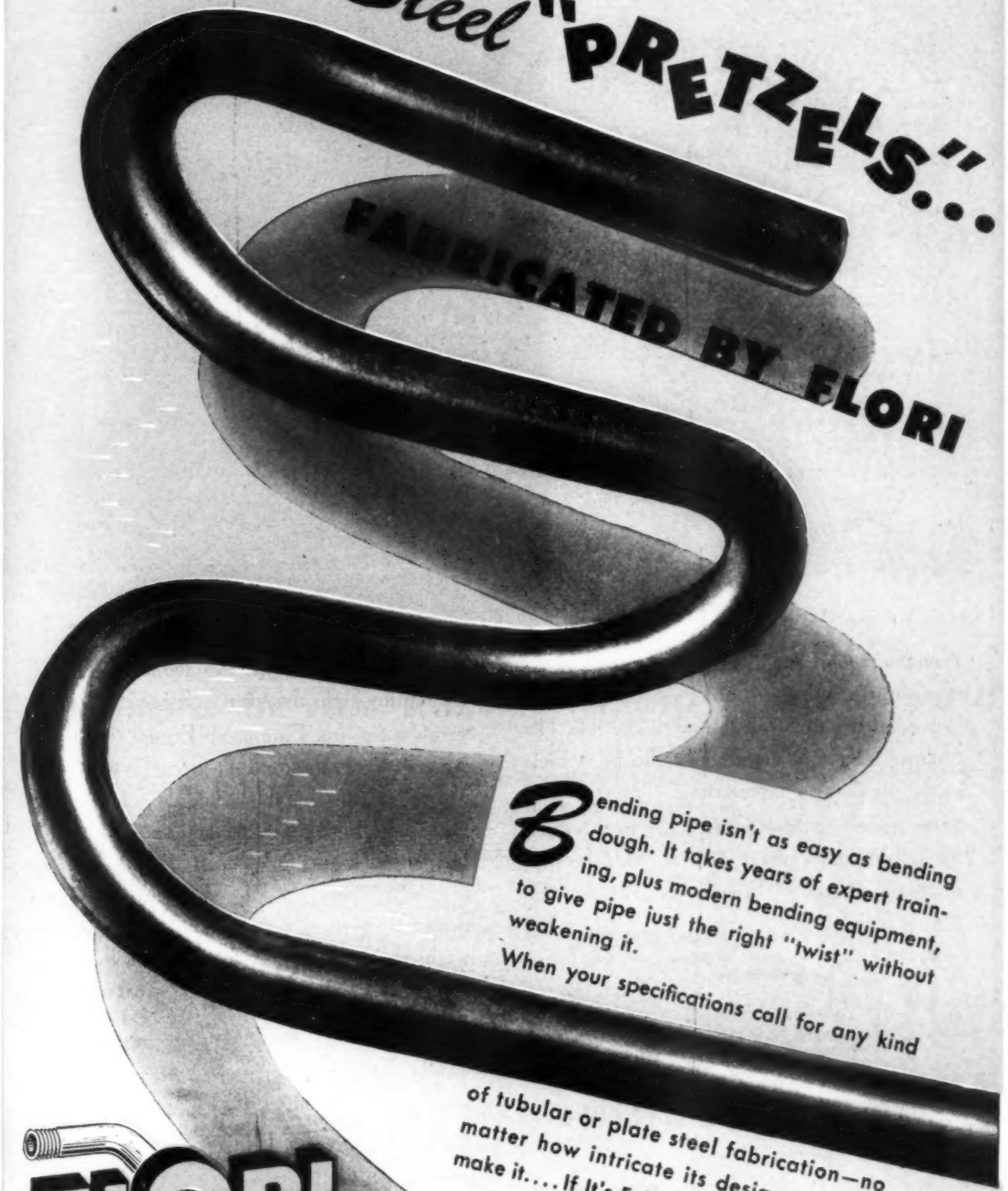

Bending pipe isn't as easy as bending dough. It takes years of expert training, plus modern bending equipment, to give pipe just the right "twist" without weakening it.

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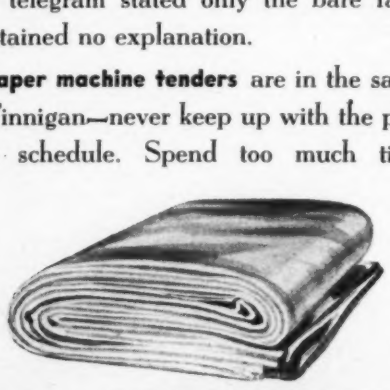
FLORI
FABRICATION

THE FLORI PIPE COMPANY • ST. LOUIS 15 • CHICAGO 47

Finnigan never could keep his train running according to the time table. As surely as he "speeded her up"—off the track she ran. His famous telegram stated only the bare facts—it contained no explanation.

Some paper machine tenders are in the same fix as Finnigan—never keep up with the production schedule. Spend too much time adjusting the wet felts. No sooner get them "on again" than they run "off again."

Here's a tip for Finnigan! Equip that machine with a Hamilton Felt. Speed it up. Now keep your eyes on the schedule. Hour after hour, day after day that machine will deliver the goods. Direct labor costs will go down as tonnage goes up. The sheets will be uniformly dryer and better formed before they reach the drier rolls. Less steam will be needed to finish the job.



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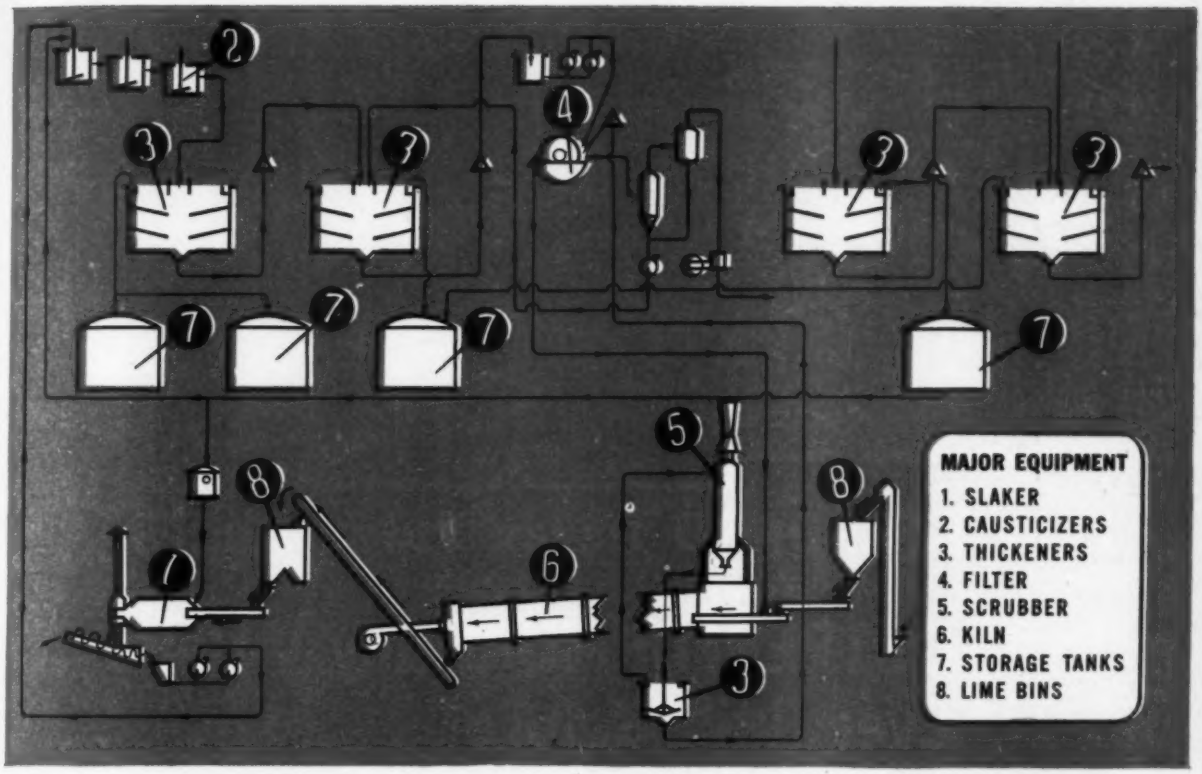
• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •



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TURBO-MIXERS
FILTERS
KILNS
THICKENERS
STORAGE TANKS
BINS
SLAKERS

A General American Recausticizing Plant is the cumulative effort of pulp mill men, design engineers, metallurgists, and fabrication experts.

This assures a plant in which the various units work together to produce a high overall efficiency and low cost operation.

Equipment designed, fabricated, and installed, (when desired), under one supervision and one responsibility makes for superior performance.

Because all the major units; slaker, causticizers, thickeners, filter, kiln, bins, and tanks are all manufactured in our own shops, it is possible to schedule fabrication to coincide with your building program.

Ask for further information. Inquiries will be promptly and intelligently answered.

General American

TRANSPORTATION CORPORATION

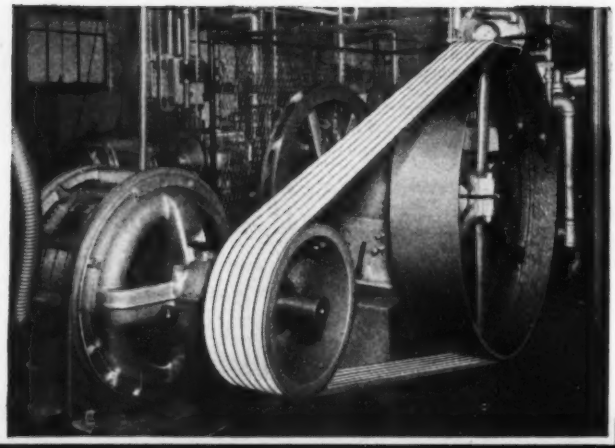
process equipment • steel and alloy plate fabrication

SALES OFFICE:
516a Graybar Bldg., New York 17, N. Y.
WORKS: Sharon, Pa.; East Chicago, Ind.

GATX GENERAL AMERICAN

OFFICES: Chicago, Louisville, Cleveland, Sharon, Orlando, St. Louis, Salt Lake City, Pittsburgh, San Francisco, Washington, D. C.

it's worth knowing why this is true



Your STANDARD Gates Vulco Ropes *Are Today* OUTPERFORMING Any V-Belts Ever Built Before!

Early in the war it was found that our Army's tanks, tractors and self-propelled big guns in combat service required V-belts far superior in strength and durability to any V-belts ever built before. Gates developed these greatly superior V-belts through intensified, specialized research —and here is why this fact is now important to YOU:—

Here is why— **Every improvement developed by Gates for U. S. Combat Units—and many later improvements, also—have been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.**

That is why, even while the war was still in progress, you were getting in your Standard Gates Vulco Ropes a product built to far higher service standards than any V-belts ever built by anyone before the war.

And that is only half the story. Through continuing specialized research, the service qualities of these superior Gates Vulco Ropes have been still further improved as all of Gates facilities and energies have been returned to the service of industry.

These are the simple reasons why the standard Gates Vulco Ropes you are getting today are delivering far better service than any V-belts ever built before!

All Gates V-Belts are Built With The Patented CONCAVE SIDE

Gates

THE MARK OF SPECIALIZED RESEARCH

THE GATES RUBBER COMPANY

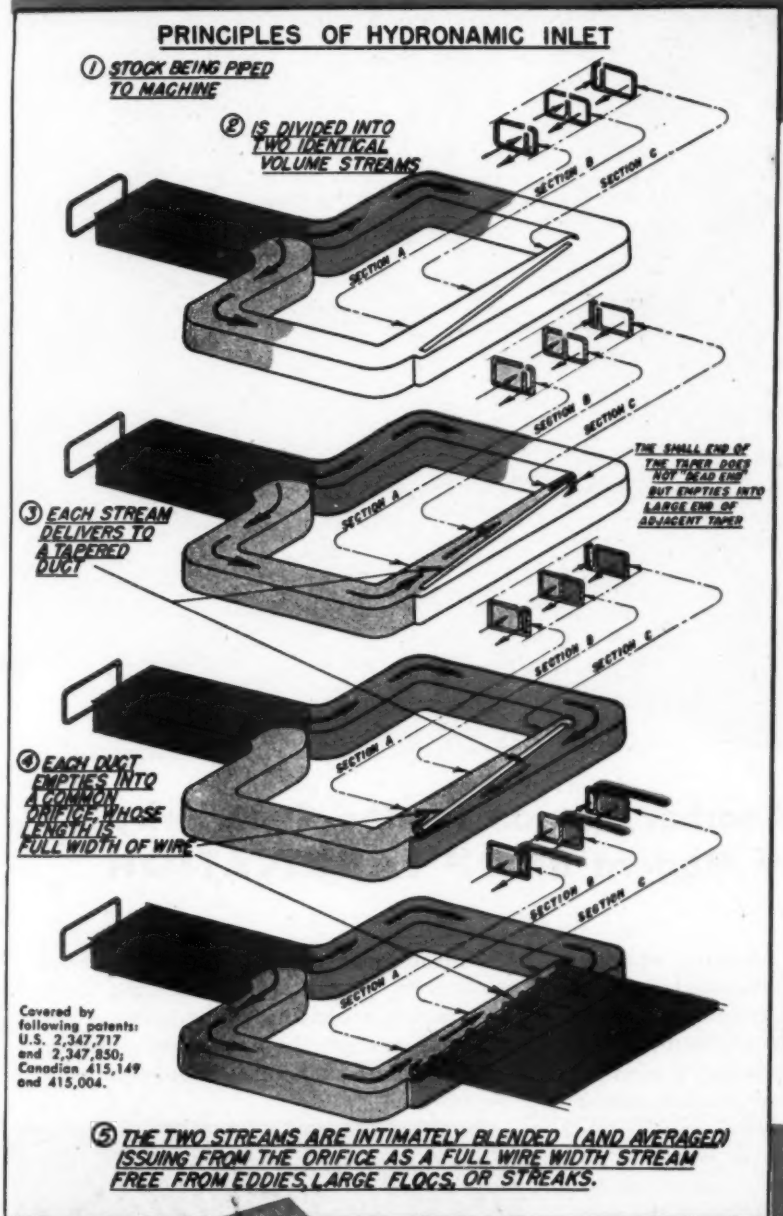
Engineering Offices and Jobber Stocks in All Large Industrial Centers

465

GATES VULCO ROPE DRIVES

CHICAGO 6, ILL., 549 West Washington. NEW YORK CITY 3, 215-219 Fourth Avenue. ATLANTA 3, GA., 521 C. & S. Nat'l Bank Bldg.
LOS ANGELES 21, CAL., 2240 E. Washington Blvd. DENVER 17, COLO., 999 S. Broadway. DETROIT 2, MICH. 223 Boulevard Bldg.
PORTLAND 9, ORE., 333 N.W. 5th Ave. DALLAS 2, TEXAS, 1710 N. Market St. SAN FRANCISCO 3, CAL., 170 Ninth St.

BLACK-CLAWSON HYDRONAMIC INLET


PRINCIPLES OF HYDRONAMIC INLET
① STOCK BEING PIPED TO MACHINE
② IS DIVIDED INTO TWO IDENTICAL VOLUME STREAMS
SECTION A
SECTION B
SECTION C
③ EACH STREAM DELIVERS TO A TAPERED DUCT
THE SMALL END OF THE TAPER DOES NOT "DEAD END" BUT EMPTIES INTO LARGE END OF ADJACENT TAPER
④ EACH DUCT EMPTIES INTO A COMMON ORIFICE WHOSE LENGTH IS FULL WIDTH OF WIRE
Covered by following patents: U.S. 2,347,717 and 2,347,850; Canadian 415,149 and 415,004.
⑤ THE TWO STREAMS ARE INTIMATELY BLENDED (AND AVERAGED) ISSUING FROM THE ORIFICE AS A FULL WIRE WIDTH STREAM FREE FROM EDDIES, LARGE FLOCS, OR STREAKS.

Study the sketches. They illustrate the principle and the flow of stock through a Black-Clawson Hydronamic Inlet.

Installations made on both fourdriniers and vats some years ago have taken the "Inlet" far past the experimental stage. User mills report advantages all mills should share:

- More uniform distribution, hence more level sheet and more uniform caliper.
- Saleable paper more quickly after start-up, less waste.
- Greater ease of manipulation, hence better control; faster wash-up.
- Permits pressure inlet, achieving for the first time high machine speeds with much more compact equipment.
- Adaptable to any machine, cylinder or fourdrinier—new or old—regardless of speed.

Take another look at the sketches, turn to recent MESSENGER *(No. 218) for further particulars, then drop us a line.*

Shartle Bros. Dilts

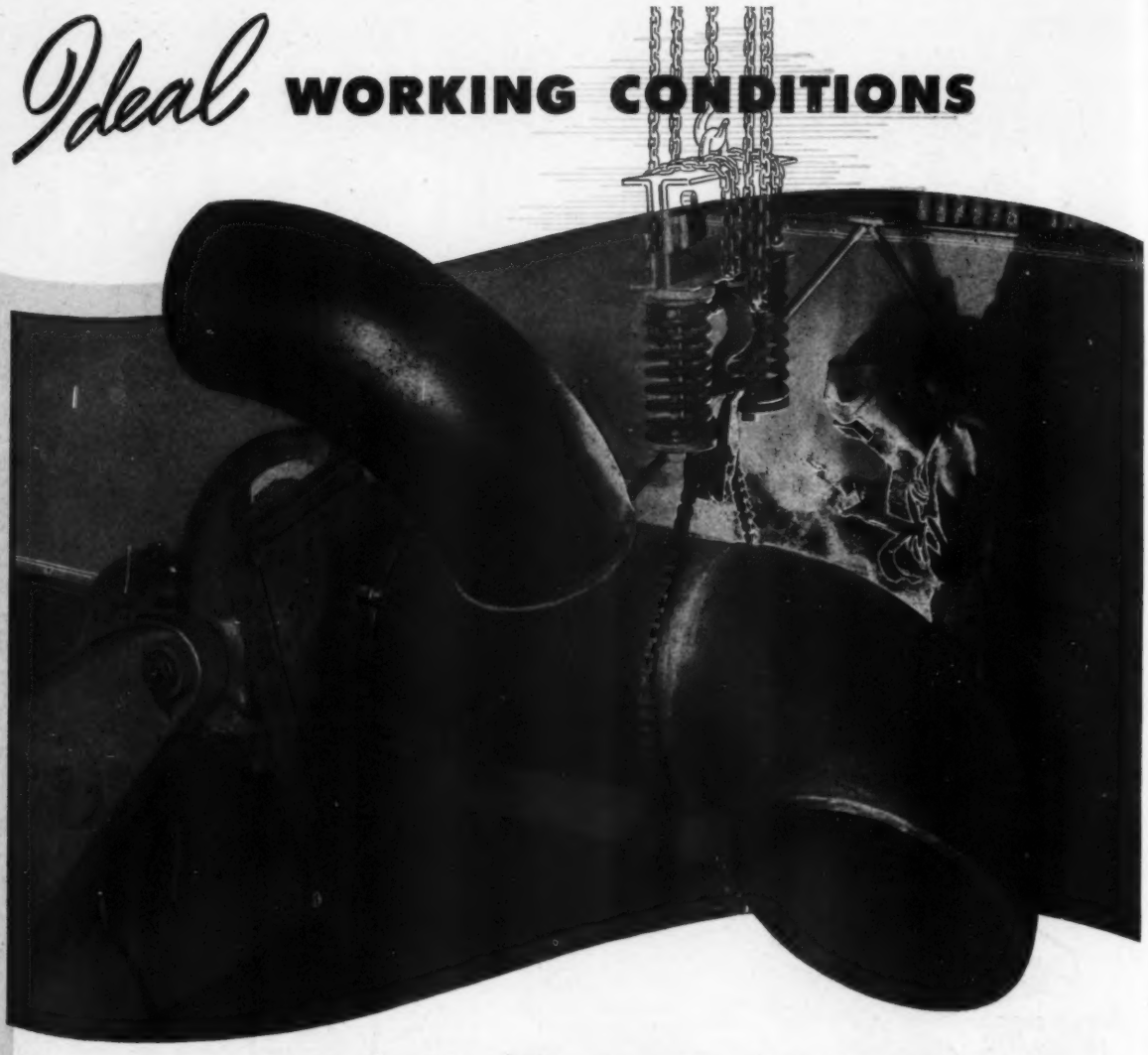
THE BLACK-CLAWSON COMPANY, Hamilton, Ohio

Divs.: SHARTLE BROS. MACHINE CO., Middletown, Ohio

DILTS MACHINE WORKS, Fulton, New York

Associate: ALEXANDER FLECK LIMITED, Ottawa, Canada

Ideal WORKING CONDITIONS



. . . Another Reason for the Superiority of Modern SHOP FABRICATION

DIFFICULT fabrication that cannot be done efficiently in the field is handled easily in the completely equipped Pittsburgh Piping plant. For example, shop equipment such as that illustrated, enables the welder to work in a down-hand position on circumferential welds. Each weld is inspected, and laboratory facilities are utilized as required to analyze welding specimens.

Quality—the important factor in the safe performance of any installation—is assured when piping is pre-fabricated in the shops of Pittsburgh Piping and Equipment Company.

The advantages of shop fabrication—extended experience, specialized engineering help, every facility for bending, Van Stoning, machining, heat-treating, stress-relieving, pressure-testing—assure an infinitely better piping job.

Pittsburgh Piping

AND EQUIPMENT COMPANY

10 Forty-Third Street — Pittsburgh, Penna.

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Chamber of Commerce Bldg., Indianapolis
Book Tower, Detroit
525 Market Street, San Francisco
634 S. Commerce Place, Los Angeles
Peoples Gas Building, Chicago
Public Square Building, Cleveland
10 High Street, Boston
Heights State Bank Bldg., Houston
Whitehead Building, Atlanta

Fewer oil changes... less deposit with improved

STANOIL

FOR 18 YEARS Standard has provided an oil containing additives to reduce oil oxidation and formation of acidity and deposits in turbines.

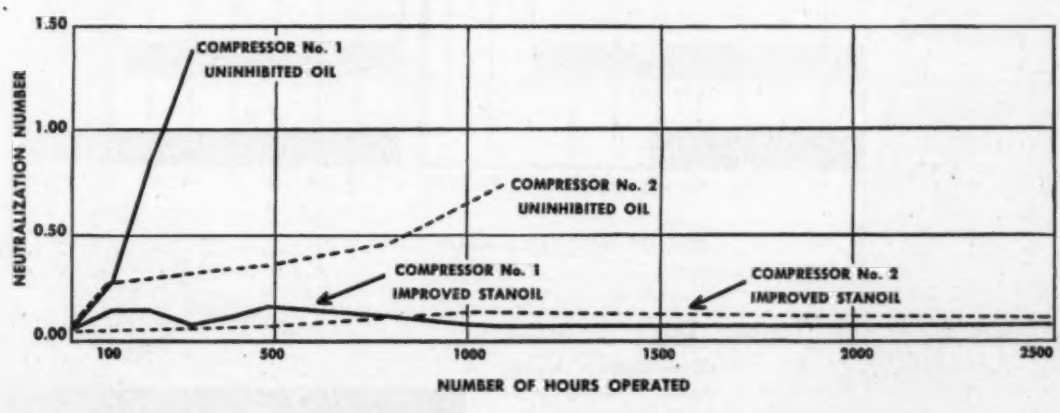
Now Standard has developed and incorporated in Stanoil an additive which improves oxidation resistance for a wide range of industrial applications. Improved Stanoil has been tested under the most severe operating conditions on many types of service: compressors, reduction gears, circulating and hydraulic systems.

Records of one of these severe tests in two compressors are charted below. They show the greatly reduced rate of acidity formation in Improved Stanoil as compared with oils previously used.

Try Improved Stanoil. Compare oil replacement records with the oil you now use in gear cases, circulating and hydraulic systems. Note how Stanoil reduces deposits in compressors.

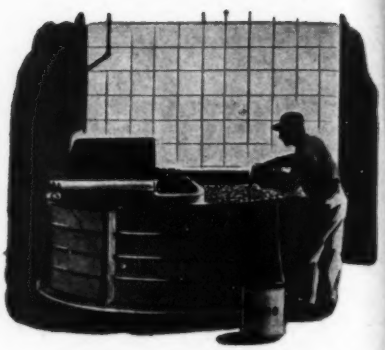
A Standard Oil Lubrication Engineer will help you make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Adverse operating conditions and 24-hour a day operation imposed severe demands on the lubricating oil in two mine compressors. Conventional oil rapidly increased in acidity, as shown by the chart. Improved Stanoil maintained a safe low acidity throughout the 2500 hour test on Compressor No. 1 and for an additional 700 hours on Compressor No. 2 until it was shut down. Make-up was comparable with both oils.



STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

NOW PAPER TOWELS CAN BE 26 TO 48% MORE ABSORBENT!



In Comparative Tests with Other Accepted Absorbency Materials, NOPCO 2272-R Gives Faster Absorbency and More Lasting Retention

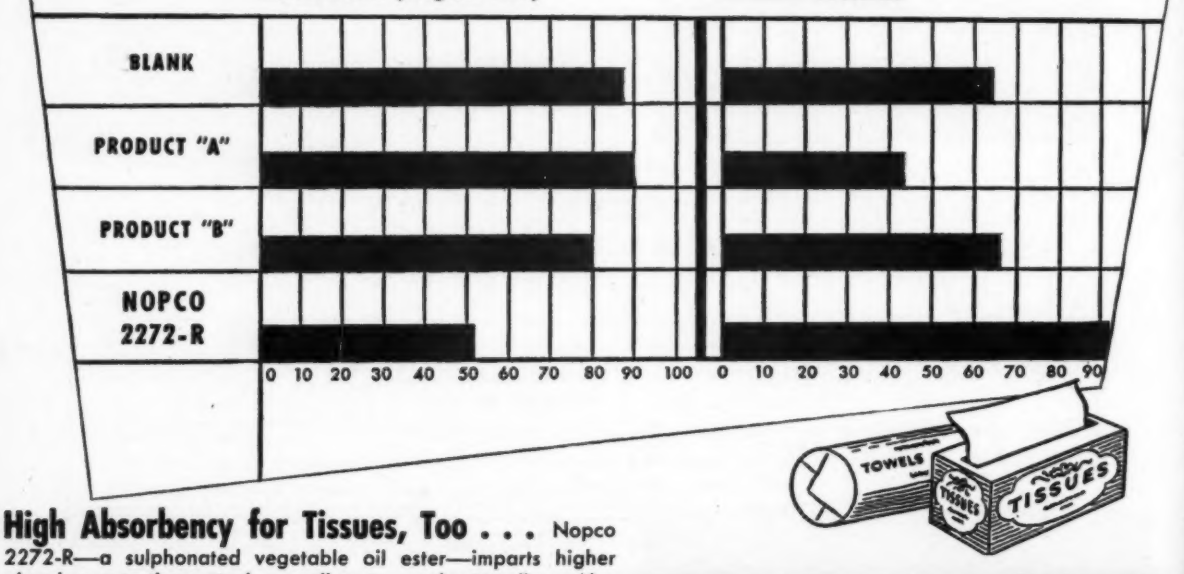
The absorbency tests, described below, show that in resisting the natural tendency of paper sheets to lose absorbency, NOPCO 2272-R has a clear-cut advantage over other absorbency materials. Even more important, regular mill users have already verified the results of these laboratory tests. To an increasing extent they count on NOPCO 2272-R to "stay with the fibers"—to assure more enduring absorbency in the *finished sheet*.

Testing Techniques Used... Sheets treated with three leading absorbency agents, including NOPCO 2272-R, and a separate group of sheets made from untreated stock were used in the tests.

Each product was added in the laboratory beater to stock composed of 300 grams of unbleached spruce sulfite and 200 grams of bleached aspen sulfite pulp dispersed with 12 liters of water. The stock was intentionally beaten to produce a harsh sheet, considerably below normal absorbency. Several hand sheets were made for testing purposes, following standard procedure.

Some sheets from each group were tested immediately for absorbency. Other sheets were tested at regular intervals for six months. Absorbency was measured by recording the time for 1 drop of distilled water to be absorbed completely into the sheet. Greater accuracy was assured, because these tests were the result of *natural* rather than *artificial* aging.

RESULT OF TESTS


AVERAGE ABSORBENCY IN SECONDS (Original Test)
% OF ORIGINAL ABSORBENCY AFTER 6 MONTHS
BLANK
PRODUCT "A"
PRODUCT "B"
NOPCO 2272-R
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80 90

High Absorbency for Tissues, Too . . . Nopco 2272-R—a sulphonated vegetable oil ester—imparts higher absorbency to tissue stock as well as to regular toweling. Also successfully used in the manufacture of specialty papers, because Nopco 2272-R is compatible with solutions or dispersions of synthetic resins added to impart wet strength. Economical—only small amounts needed. Write for further details.

NATIONAL OIL PRODUCTS CO., Harrison, N. J.,
Branches: Boston; Chicago; Cedartown, Ga.; Richmond, Calif.

NOPCO

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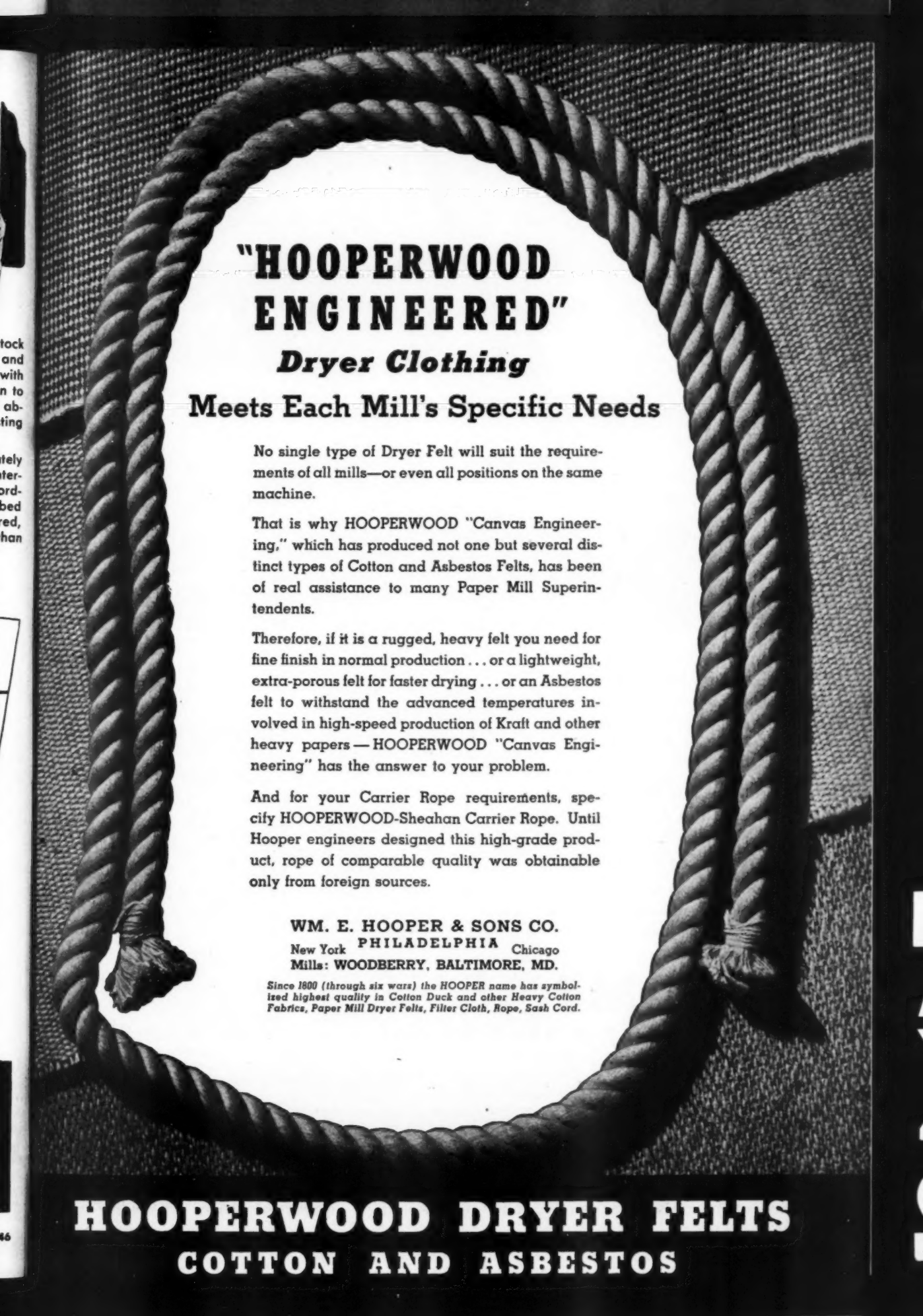
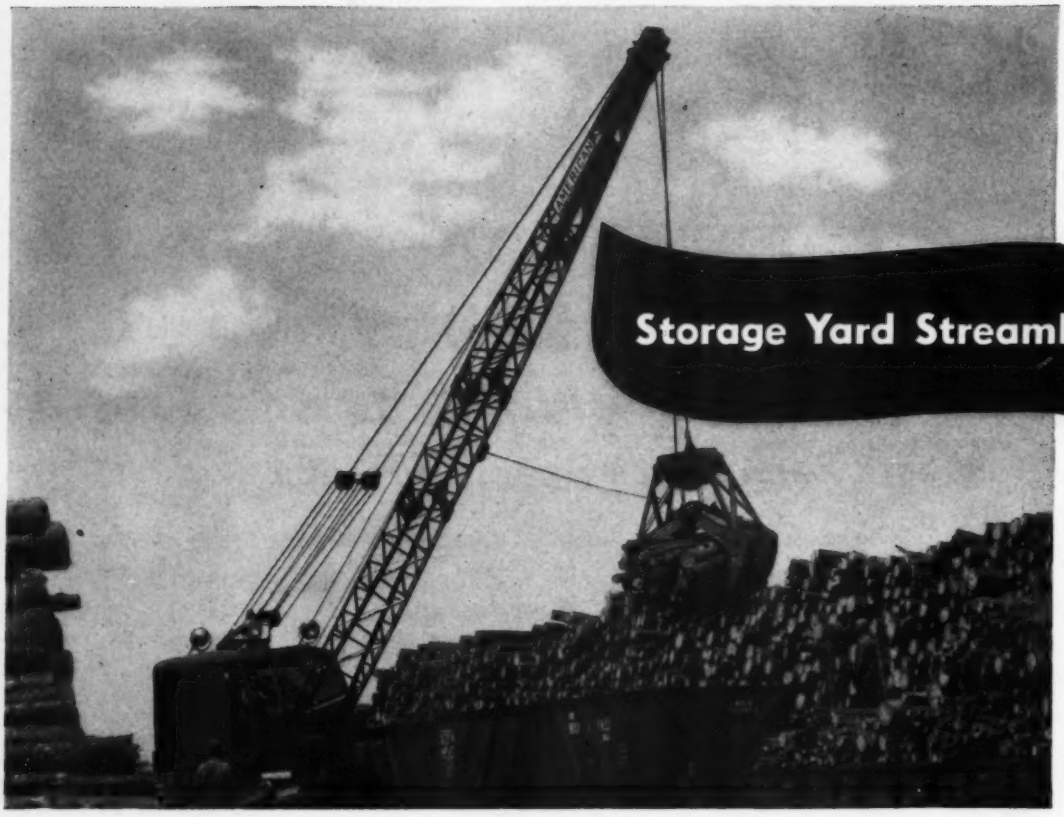
"An Affiliate of the American Pulp and Paper Mill Superintendents Associates".

EVOLVED THROUGH RESEARCH

NOPCO 2272-R
For Higher Absorbency

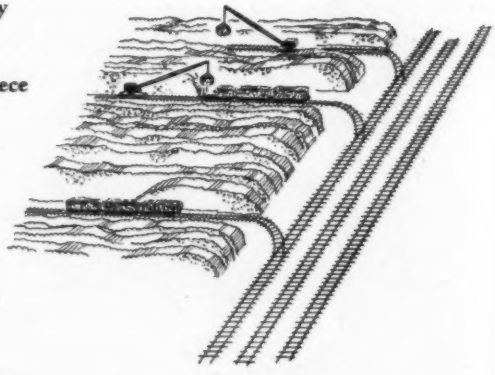

"HOOPERWOOD ENGINEERED"
Dryer Clothing
Meets Each Mill's Specific Needs
No single type of Dryer Felt will suit the requirements of all mills—or even all positions on the same machine.
That is why HOOPERWOOD "Canvas Engineering," which has produced not one but several distinct types of Cotton and Asbestos Felts, has been of real assistance to many Paper Mill Superintendents.
Therefore, if it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos felt to withstand the advanced temperatures involved in high-speed production of Kraft and other heavy papers — HOOPERWOOD "Canvas Engineering" has the answer to your problem.
And for your Carrier Rope requirements, specify HOOPERWOOD-Sheahan Carrier Rope. Until Hooper engineers designed this high-grade product, rope of comparable quality was obtainable only from foreign sources.
WM. E. HOOPER & SONS CO.
New York PHILADELPHIA Chicago
Mills: WOODBERRY, BALTIMORE, MD.
Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope, Sash Cord.
HOOPERWOOD DRYER FELTS
COTTON AND ASBESTOS



● Bring all the advantages of Diesel-electric power to your mill storage yard! The new "American" Diesel-Electric Locomotive Crane provides the ideal private switching engine AND perfect flexibility to grapple, bucket and hook operations.

The rail-served storage yard comes into its own as this one piece of equipment streamlines all storing and stock-piling, unloads ships, builds track. Fast, smooth, steady, low-cost handling . . . easy operation, winter and summer . . . extremely low maintenance . . . all are assured. It's smoke and spark-free.

Improve, expand *your* storage and stock-piling facilities this modern way. We have the performance facts — they're yours for the asking! Ask for Catalog 600.



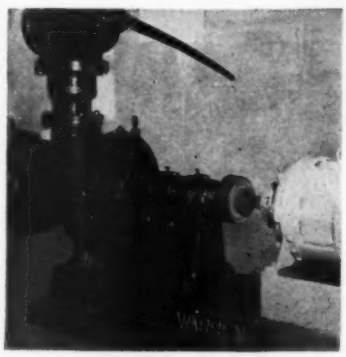
AMERICAN
HOIST & DERRICK CO.
St. Paul 1, Minnesota
CHICAGO NEW YORK SAN FRANCISCO

REVOLVERS LOCOMOTIVE CRANES HOISTS DERRICKS BLOCKS AND SHEAVES CROSBY CLIPS

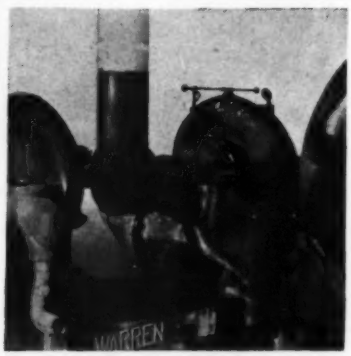
Sturdy, reliable pumping equipment for Service . . .

"Beyond the Call of Duty"

Here are four of over 50 Warren pumps that are in operation in a Southern Mill



Pumping Stock to Head Box



Mill Water Supply Pump

Reservoir Supply Water Pump

Plant Fire Pump

MANY mills are turning to Warren for aid in modernizing their pumping equipment. Why?

. . . *Because* Warren can draw on a half century of highly specialized experience in the industry.

. . . *Because* Warren Pumps are known throughout the industry for efficient, reliable performance.

. . . *Because* Warren offers an engineered pump for almost every application—for handling pulp stocks, liquors in sulphite, soda and kraft mills, water for mill supply, showers, white water, wash-down, etc., for boiler feed and all power plant requirements.

There's a Warren representative near you. Why not discuss your problem with him and get his recommendation? Write

WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

Atlanta Boston Chicago Cleveland Denver Detroit
Houston Hartford Los Angeles Minneapolis
New Orleans New York Philadelphia Pittsburgh
Richmond San Francisco Seattle St. Louis

PP-2

WARREN PUMPS

For Greater Dependability . . . Longer Life . . . Lower Maintenance

It's a small world

IN BANGKOK you can buy clocks made in New York. The same brands of soap are sold in Paris, France, and Paris, Texas.

Essential to this world-wide trade is good packaging—and one of the most important packaging materials is *paperboard.* It's light but tough and highly resistant to weather and water.

For the making of paperboard, Wyandotte Chemicals Corporation furnishes huge quantities of *soda ash* and *caustic soda, chlorine* and *calcium carbonate.*

The *soda ash* is used to reclaim waste material and de-ink waste paper. It and *caustic soda* reduce the mixture of scrap paper, straw and wood to a workable pulp from which strong and durable containers are made.

Chlorine is important in the bleaching process. And when an attractive paperboard package is desired, Precipitated Calcium Carbonate helps produce a high-grade coating.

So, through its vast production of these chemicals, Wyandotte plays a vital part in helping speed American commerce over the seven seas.

Wyandotte
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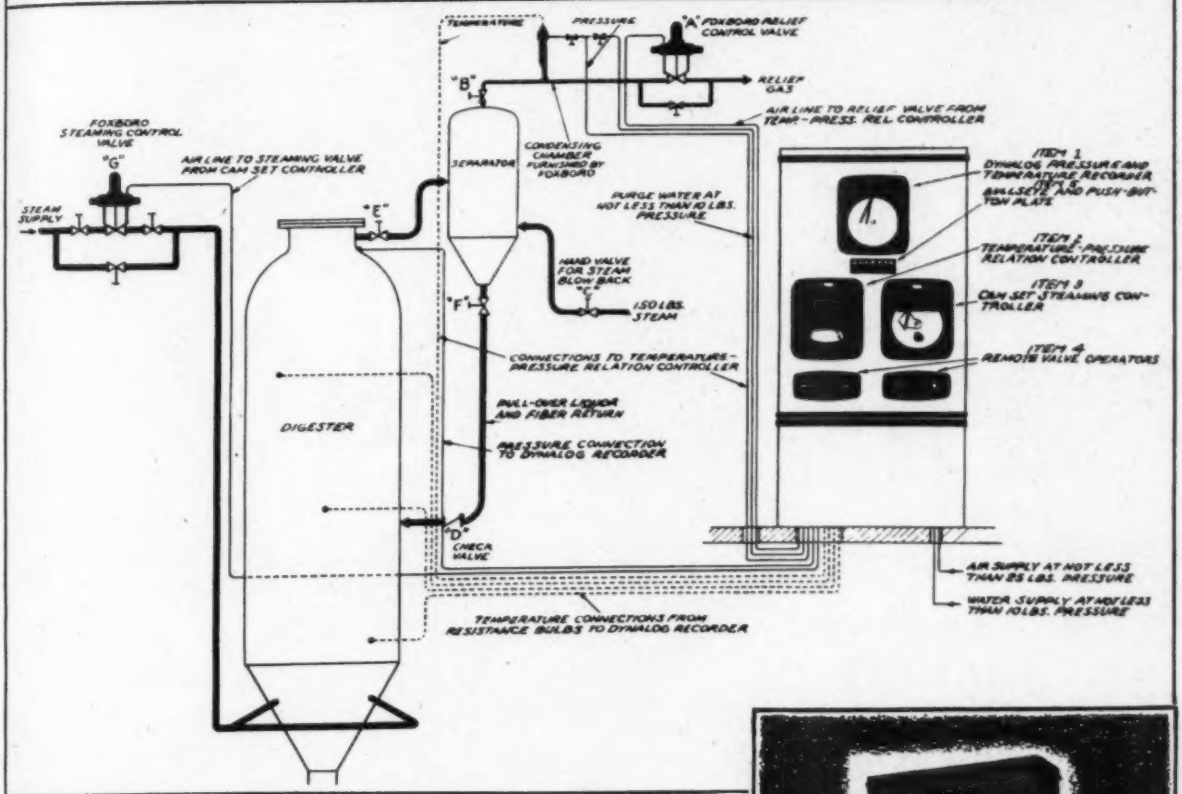
OFFICES IN PRINCIPAL CITIES

WYANDOTTE CHEMICALS CORPORATION • WYANDOTTE, MICHIGAN

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine
Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals

EXTRA PULP PROFITS

from a Compact, Engineered "Package"!


TEMPERATURE
PRESSURE
"A" FOXBORO RELIEF CONTROL VALVE
"B"
RELIEF GAS
AIR LINE TO RELIEF VALVE FROM TEMP.-PRESS. REL. CONTROLLER
FOXBORO STEAMING CONTROL VALVE
"G"
AIR LINE TO STEAMING VALVE FROM CAM SET CONTROLLER
STEAM SUPPLY
SEPARATOR
CONDENSING CHAMBER FURNISHED BY FOXBORO
PURGE WATER AT NOT LESS THAN 10 LBS. PRESSURE
"E"
HAND VALVE FOR STEAM BLOW BACK
"F"
150 LBS. STEAM
ITEM 1. DYNALOG PRESSURE AND TEMPERATURE RECORDER WITH BULLSEYE AND PUSH-BUTTON PLATE
ITEM 2. TEMPERATURE-PRESSURE RELATION CONTROLLER
ITEM 3. CAM SET STEAMING CONTROLLER
ITEM 4. REMOTE VALVE OPERATORS
CONNECTIONS TO TEMPERATURE-PRESSURE RELATION CONTROLLER
DIGESTER
PULL-OVER LIQUOR AND FIBER RETURN
PRESSURE CONNECTION TO DYNALOG RECORDER
"D"
CHECK VALVE
AIR SUPPLY AT NOT LESS THAN 85 LBS. PRESSURE
WATER SUPPLY AT NOT LESS THAN 10 LBS. PRESSURE
TEMPERATURE CONNECTIONS FROM RESISTANCE BULBS TO DYNALOG RECORDER

A Foxboro Automatic Digester Control System offers higher fiber yield, lower alkali consumption

Consider what you'd stand to gain if your yield-per-digester could be stepped up 1% . . . or even $\frac{1}{10}$ of 1%. That will give you a rough idea of the extra pulp profits many mills are now getting from installations of Foxboro Automatic Digester Control Systems!

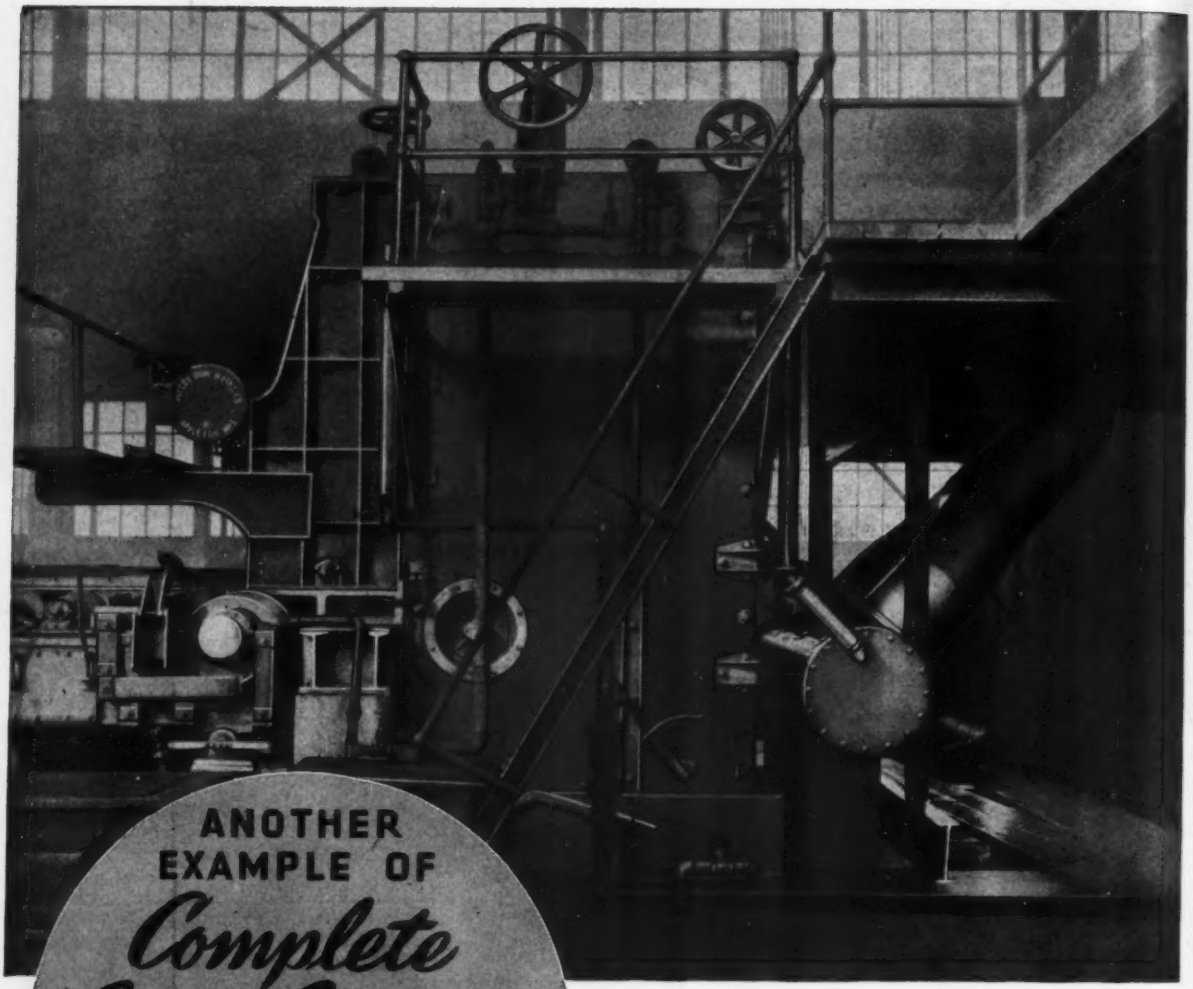
These efficiency-boosting control systems are designed as complete units, readily adaptable to any type of alkaline digester installation. Automatically, they maintain such close control of cooking time, temperature and relief that wasteful operating variations are held to new minimums. Steam, chemical and labor requirements are reduced . . . both pulp quality and uniformity are substantially improved.

Write for complete information on these new Foxboro "packaged profit-builders" for alkaline pulp digesters. Also details of similar Foxboro Control for sulphite processes. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.

Foxboro Automatic Digester Control Unit with controlled rate of temperature rise. Dynalog Temperature Recorder at top. Beneath are Foxboro Digester Relief Controller and Foxboro Cooking Schedule Controller with cam-set control point.

FOXBORO REG U S PAT OFF

Automatic DIGESTER CONTROL



ANOTHER EXAMPLE OF

Complete Stock Entrance

BY

VALLEY

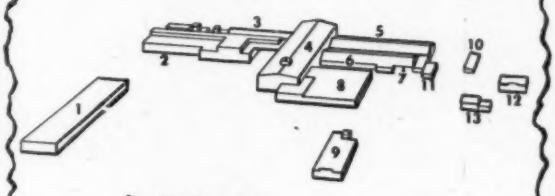
PREËMINENCE THRU PROVEN PERFORMANCE

EVERY VALLEY INLET HAS MADE MONEY FOR ITS USER!

VALLEY IRON WORKS CO. **APPLETON, WIS.**

Slices and Head Boxes • Screw Presses • Micro-Mist Spray Dampeners • Laboratory Equipment
Pulp Washing Systems • High-Speed Beaters • Breaker Beaters • Vortex Beaters • Plug Valves
Flat and Rotary Screens • Thickeners • Deckers • Paper Markers • Roll-Headers

UNDER COOPER'S "ROOFED ACRES" are produced the finest in stainless steel castings



1 Machine Shop
2 Chemical & Metallurgical Laboratories (X-Ray and Zygio Depts.) Engineering Department
3 Core Shop
4 Foundry
5 Finishing Department
6 Maintenance Department
7 Fitting and Valve Warehouse
8 Pattern Storage
9 Pattern Shop
10 Heat Treating Department
11 Pickling & Lustracast Department
12 Office
13 Restaurant

Space — ample, usable space — is necessary to the proper operation of any foundry, but only Cooper has *three acres* of roofed plant facilities devoted exclusively to the production of stainless steel castings.

Vast as this area is, every square foot has a functional duty in the Cooper operation — and there are seven additional acres, as yet unimproved, available for further expansion.

To you, as a user of stainless steel castings, Cooper's unparalleled facilities mean a sounder product and more reliable delivery — and you benefit by all the latest developments in foundry equipment and procedure. You will benefit, too, because the entire Cooper organization — from laboratory to foundry — is large enough to provide *all* the specialized knowledge required to give you superior castings — as well as the best advice as to their application.

Whenever you need stainless steel castings — get in touch with Cooper.

THE COOPER ALLOY FOUNDRY CO.
125 Bloy Street, Hillside, N. J.

CA-108

SPECIFY "GENERAL CHEMICAL"

for effective pH control and maximum sizing

GENERAL CHEMICAL COMPANY products for the Paper Industry

Aluminum Sulfate (Standard and Iron Free) • Copper Sulfate • Muriatic Acid (Hydrochloric) • Sodium Fluoride • Sodium Silicate • Sodium Metasilicate • Glauber's Salt (Crystal or Anhydrous) • Salt Cake • Sodium Sulfide • Sodium Hyposulfite • Sodium Sulfite (Anhydrous) • Sodium Bisulfite (Solution or Anhydrous) • Disodium Phosphate • Trisodium Phosphate • Tetrasodium Pyrophosphate • Sulfuric Acid • Nitre Cake (Sodium Bisulfate) • Nitric Acid

TODAY more than ever, paper makers are insisting on General Chemical "Alum" in their operations because they can rely on its uniformity for maximum sizing and desired pH.

Careful attention to all production details plus constant laboratory control make General Chemical Aluminum Sulfate a product of high quality in its various grades. Specify "General" for your quality paper-making chemicals!

ALUMINUM SULFATE

Standard—Lump; Ground 99% thru 8 mesh, 95% thru 10 mesh; Powdered 95% thru 100 mesh.

Iron Free—Lump approx. 2½"; Ground thru 8 mesh.

SODIUM SILICATE

Solutions: from 38°—60° Baume. Wt. Ratio (Na_2O to SiO_2) from 1:2.00—1:3.40.

Appearance: Opalescent to clear.

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

GENERAL CHEMICAL COMPANY

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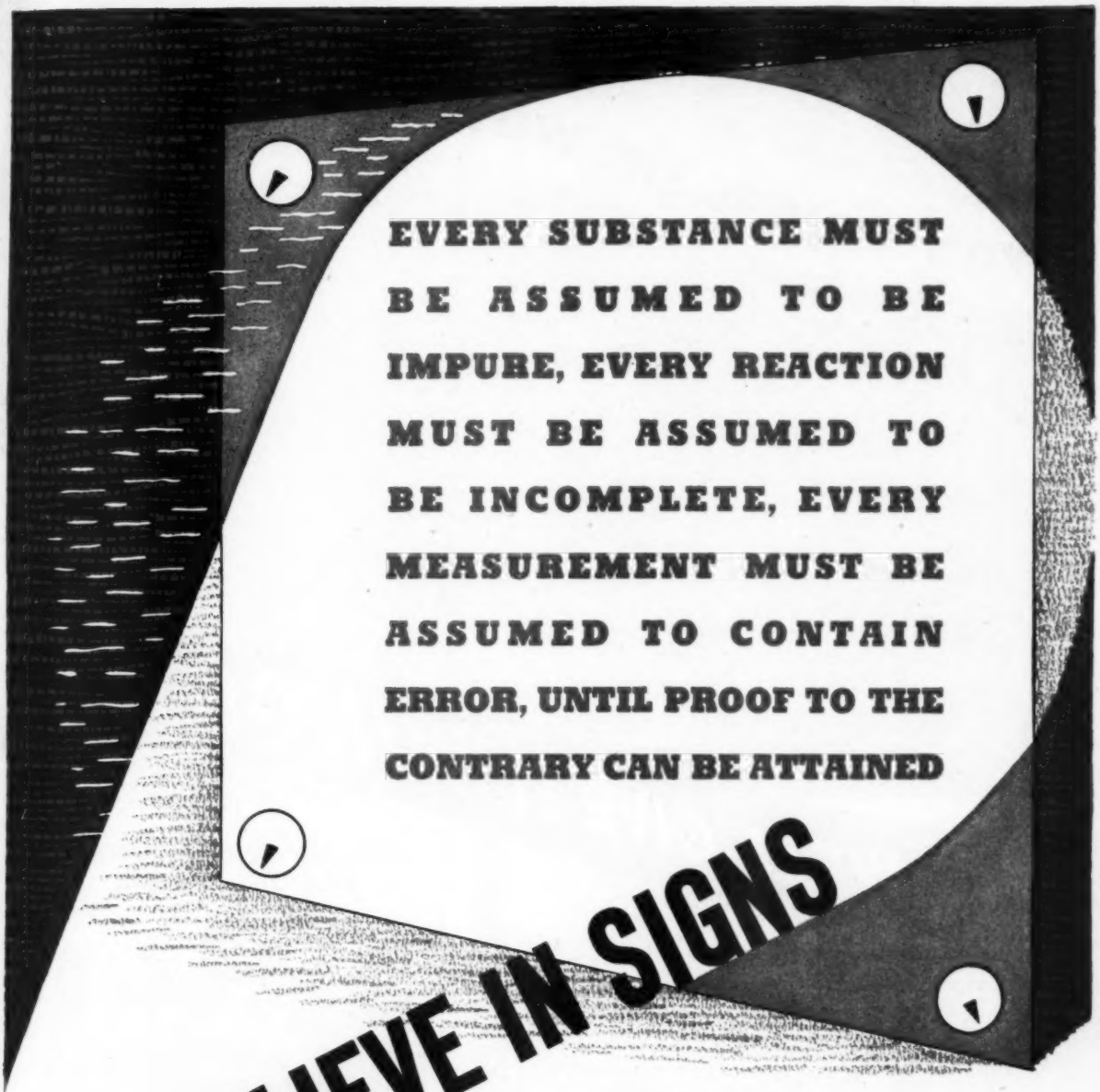
EVERY SUBSTANCE MUST BE ASSUMED TO BE IMPURE, EVERY REACTION MUST BE ASSUMED TO BE INCOMPLETE, EVERY MEASUREMENT MUST BE ASSUMED TO CONTAIN ERROR, UNTIL PROOF TO THE CONTRARY CAN BE ATTAINED

WE BELIEVE IN SIGNS

This one is prominently posted in our chemical and metallurgical laboratories. It explains the high degree of perfection of

N • B • M
BRONZE PARTS

NBM
NATIONAL BEARING
DIVISION
ST. LOUIS • NEW YORK
AMERICAN Brake Shoe COMPANY

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

Paper winders of every size and type will develop their top capacity with fewer breaks and control troubles when equipped with G-E winder drives.

From the simplest a-c drive to the newest amplidyne-regulated d-c drive with regenerative tension control, these G-E equipments are based on long-term, practical experience with paper-mill operations. Close liaison with machine builders assures a well-matched combination of winder, gear-reduction unit, motor, and control.

G-E application engineers, who know the problems of paper-mill electrification, will be glad to work with you or your consulting engineers on this or any other paper-mill drive problem. ***Apparatus Dept., General Electric Company, Schenectady 5, New York.***

FOR TOP-SPEED WINDING WITHOUT A BREAK

D-C WINDER DRIVE
WITH
regenerative tension control

This modern type of winder drive speeds output and assures a roll of uniform density from start to finish. Paper tension is held constant at all times, including the acceleration and deceleration periods.

D-c, adjustable-voltage drives—For single- or double-motor winders where tension-control can be adequately maintained by mechanical means, G.E. furnishes complete drives from 20 to 400 hp, including motor-generator set, d-c motors, and 50-division generator-field control. A factory-assembled control panel includes all the necessary contactors, overload relays, and resistors.

A-c wound-rotor drives—on winders where speed control need not be critical over a wide range, G.E. supplies drives powered by a-c wound-rotor motors, with simple, long-lasting drum-type controllers.

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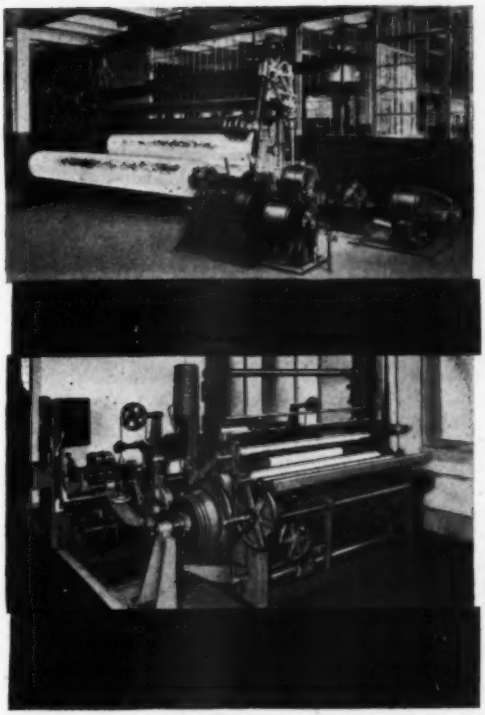
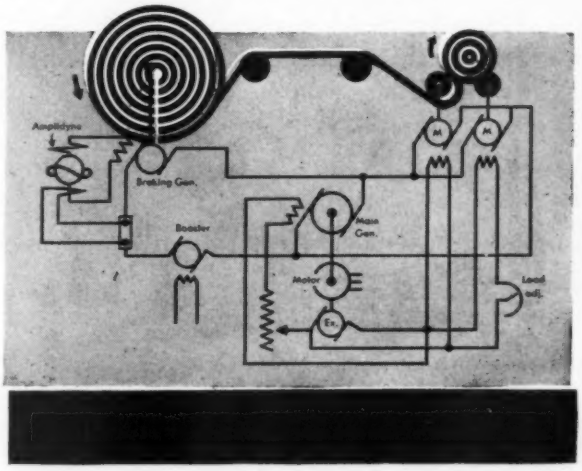


Tension can be adjusted precisely by a dial on the operator's panel. An amplidyne and booster-generator unit maintains stalled tension, aids smooth starts, and thus avoids paper breaks.

A factory-assembled main control panel, and a metal-enclosed operator's panel conveniently located, are included in the complete drive.



Side view of winder, showing convenient operator's control panel for regulating speed and tension

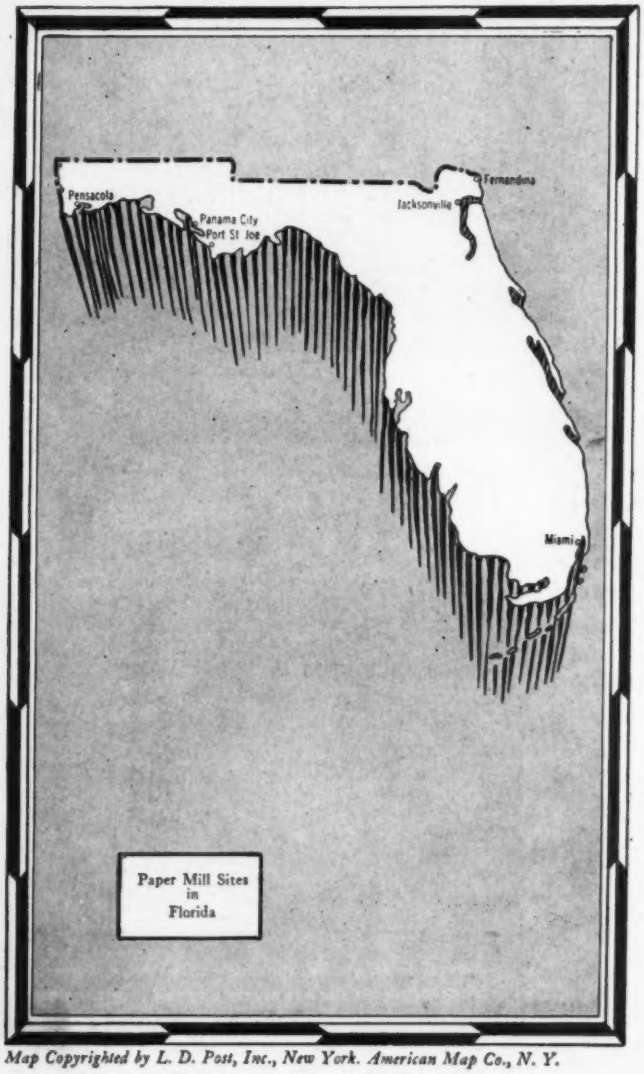
GENERAL ELECTRIC

469-21-127

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 17 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS



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HIGH LIGHTS:

Florida — associated in the public mind with citrus fruits and winter bathing beauties, is rarely thought of as an important producer of pulp and paper. As recently as 1916, when *A History of Paper Manufacturing in the United States* was published, it contained no reference to Florida. But turn to the table of "Rated Daily Capacity of Paper and Pulp Mills" in the latest (1945) edition of *Post's Paper Mill Directory* and we find out of 36 States where paper is being made, that Florida stands second in capacity for sulphate pulp, eighth in sulphite pulp and thirteenth in paper and board.

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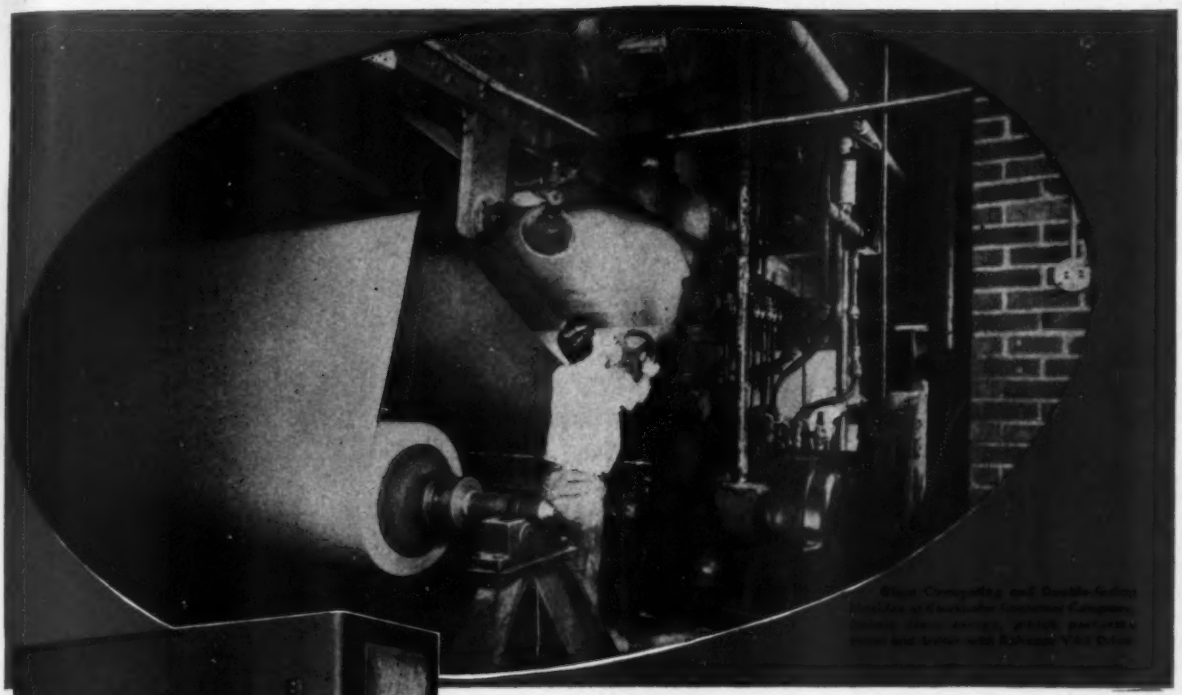

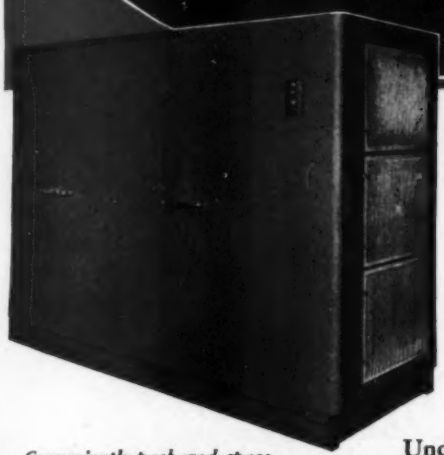

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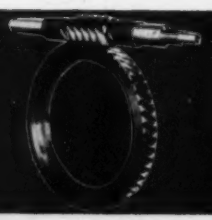

WORM GEAR DIVISION

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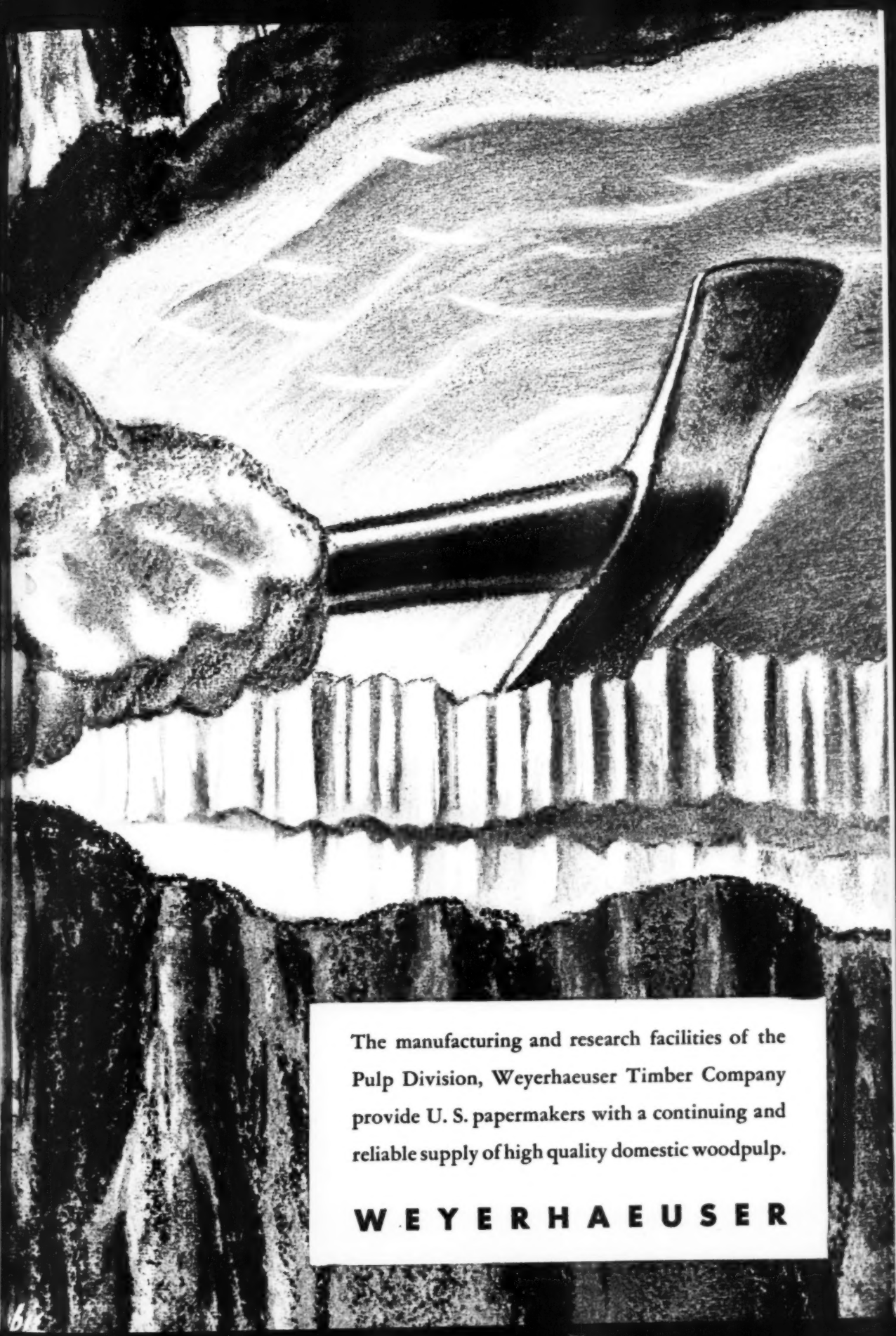

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THE PAPER INDUSTRY
and PAPER WORLD

MAY, 1946

Photography *in the Pulp and Paper Mill*

GEORGE SCHNITZER
Research Chemist
Southland Paper Mills, Inc.

▸▸▸ PICTURECRAFT is a hobby that has spread around the world — probably leading all others. It is a hobby that can be turned into practical use in industry. In a pulp and paper mill, to be specific, there is a wide range of material — from bacteriological work in the laboratory to production on the machine and shipping of the finish product — that can be photographed for study or for making a permanent record.

Photographic work at Southland is divided into two main classes: straight photography, and photomicrography. The camera used for ordinary photography is a Kodak Recomar — a ground glass focusing camera using 9x12 cm. film packs or cut films, and having a 135 mm. f:4.5 anastigmat lens.

The camera has a double extension bellows which is useful for close-up work. It also permits photographing small objects at full size.

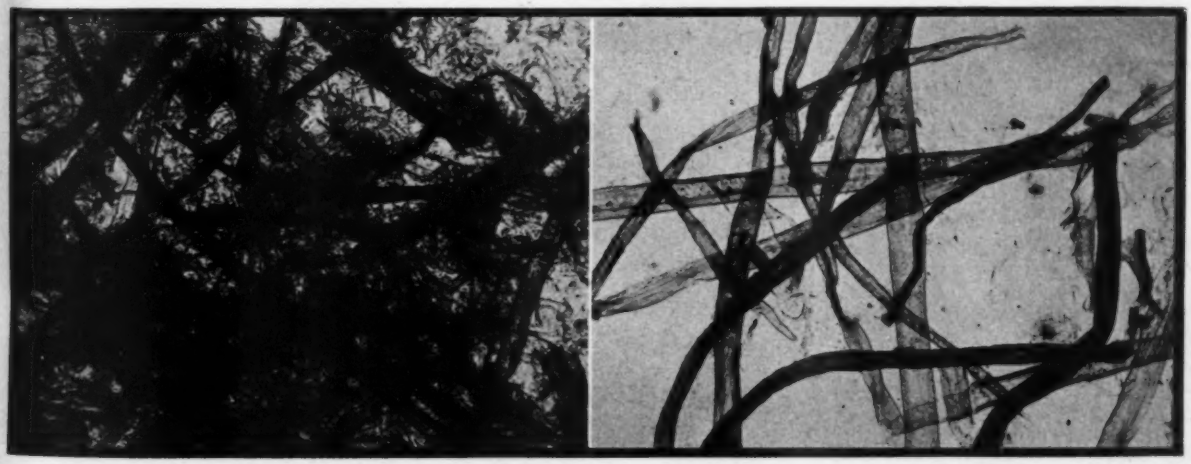
The camera also has a range of diaphragm openings from f:4.5 down to f:32, and speeds of one second to one two-hundredth of a second with bulb, time, and delayed action.

The few accessories necessary with the camera are: a tripod with tilting head, an exposure meter, and several photofloods.

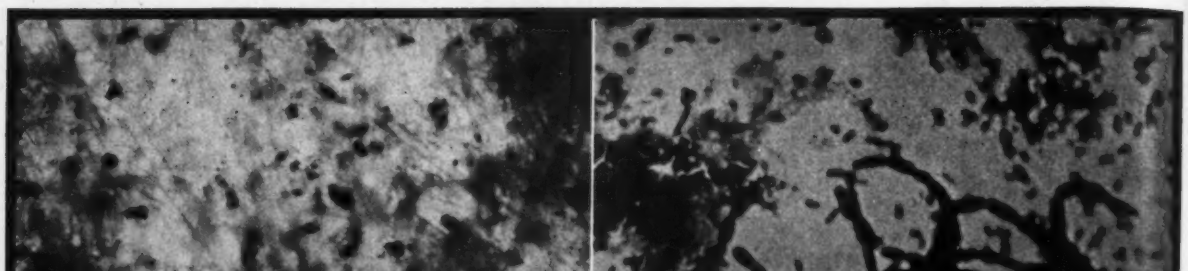
Since most of the work with the camera is on stationary objects, a photoflash adapter has not been considered essential, although at times, such an adapter would be beneficial.

Only panchromatic film of medium or fast emulsion speed has been or is being used. This selection of film was made since graininess in final prints is not a factor unless negatives are to be enlarged.

Used in the form of film packs, each film exposure or series of exposures may be removed from camera and



Photomicrographs of pine groundwood (left) and pine sulphate (right) after jordaning. Both 85X



Photomicrographs of newsprint sheet showing distribution of starch granules stained with iodine—50X (left) and bacteria from culture made from sewage sludge (right)

developed without waiting for an entire roll to be taken. This procedure could be followed with cut film but in this case darkroom reloading would be required. With film pack, darkroom reloading is unnecessary.

In taking pictures of mill equipment or other such objects, only one color or two colors of considerable contrast commonly need to be considered. Filters to improve contrast or detail usually are superfluous. There are some cases in which the use of a filter might be of some aid; but the proper use of filters requires intensive study of types available and under what conditions each type would be of benefit. In brief, the selection of the proper filter is dependent on the light source, color or colors of the object to be photographed, the film that will be used, also the effects desired.

At times, odd contrivances are necessary for taking unusual pictures. Here the ingenuity of the photographer can be brought into play.

For photomicrography, a darkroom is quite essential. This room at Southland is supplied with a Bausch & Lomb vertical camera equipped with ground glass plate, diaphragm and shutter, and fitted to use with a Bausch & Lomb microscope. The film is 5 x 7 cut film in film holders. It is an orthochromatic commercial film of medium speed.

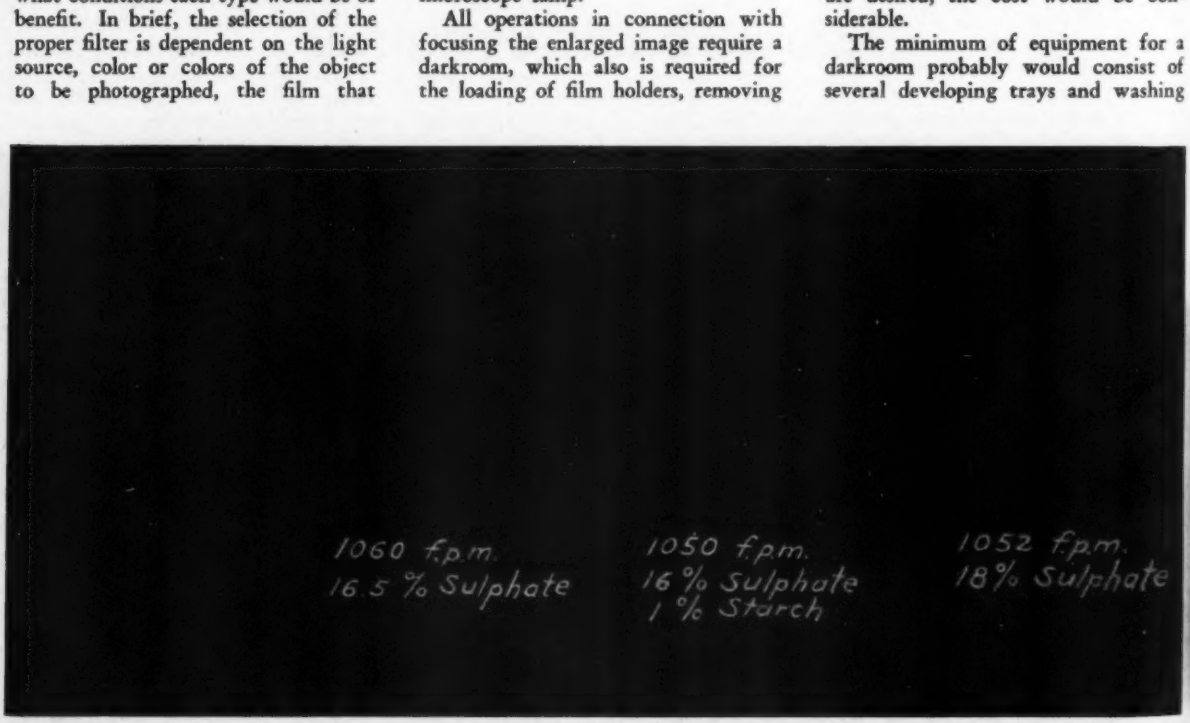
The light source is a Bausch & Lomb microscope lamp.

All operations in connection with focusing the enlarged image require a darkroom, which also is required for the loading of film holders, removing the film, developing the film, and making the prints.

Several Wratten filters, mainly green B No. 58, have been used in the photomicrographic work at Southland. The green B No. 58 filter picks up green as white and the other colors as black. Used when studying fibers stained with methylene blue, the green B No. 58 filter gives considerable contrast, more detail, and greater sharpness than could be obtained without it.

The cost of equipping a darkroom may vary from a moderate cost to a considerable sum. If automatic cooling baths, warm air, film dryers, etc., are desired, the cost would be considerable.

The minimum of equipment for a darkroom probably would consist of several developing trays and washing

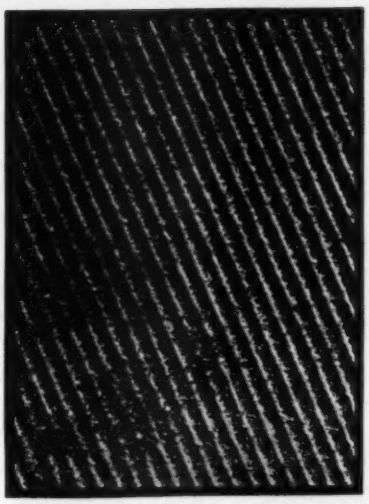


Contact print of strips of newsprint. Left strip from northern mill; other three from Southland

trays, a timer, a contact printer, a thermometer, an inexpensive scale for weighing out chemicals for various solutions (packaged developers and fixers are available at only slighter higher prices than the chemicals alone), a safelight, a fan (some of the solutions give off quite irritating or noxious vapors), and running water.

It is usually possible to find a commercial photographer who will do developing and printing work for a mill laboratory or studio, and probably at a price lower than it can be done by the mill staff. Yet, because of the control which the mill staff has over the work, especially in photomicrography, it is advisable to have a darkroom at the mill and for the staff to do its own work. The principal advantage of this method is that control can be exercised in all phases of the work, from the developing of the film to the final printing. For example, by varying developers and developing technique, special details in pictures may be emphasized; or imperfectly exposed or developed negatives can be much improved by using intensifiers or reducers. This variation in technique is quite an advantage in photomicrography because correct exposure times often are difficult to judge. Another advantage in having the mill staff do its own work is the saving of time.

Identification of photographs is an important detail in connection with any photographic work that is done for future study or for permanent record. Each photograph taken by the staff at Lufkin is recorded in a log book with a serial number and letter (for various classifications of materials); and with data on the films used, lights, exposure time, diaphragm opening, filters (if any), date, and description of the subject. After a run has been developed and dried, a serial number and letter is printed on



Full scale photo of surface of grinder stone

the reverse side (not the emulsion side) of each of the negatives. The printing is done in India ink on a comparatively clear portion of the negative. If the negative is too dark except in the area pertinent to the subject matter of the photograph, a little of the emulsion from the dark area can be scraped away with a sharp blade after wetting to obtain a suitable area to carry the legend. As stated before, the lettering must be placed on the reverse side of the negative. Otherwise, when printed, the lettering would be reversed. (To correctly print a negative, the emulsion side should be placed against the emulsion side of the paper.)

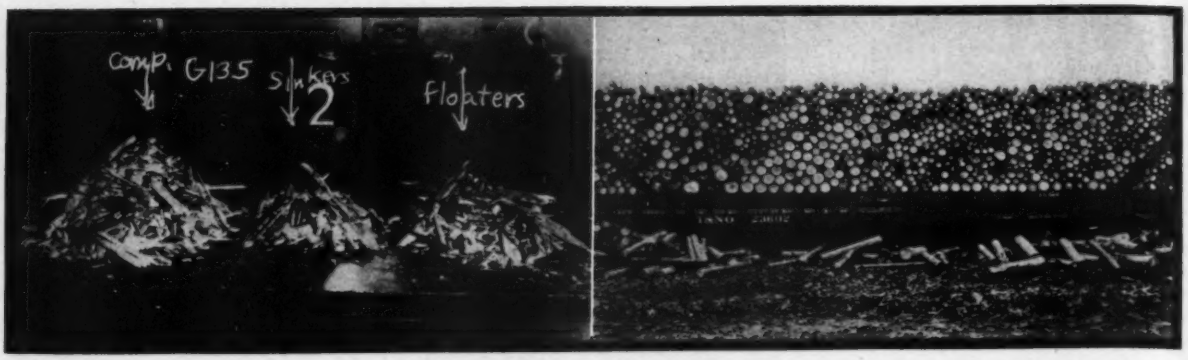
Much of the photographic work at Southland has been to record faults in materials and machinery. Photographs of this kind serve as visual proof for possible damage claims. Similarly they can be taken over a period of time to show abnormal wear or corrosion of parts. Before and after photographs are good exhibit material for use in determining corrective steps to be taken in case of a failure or for use in discussing future improvements in design with equipment manufacturers.

The main object of such photography is to show the fault or faults with little regard to the rest of the subject which the camera may record. At times, close-ups must be made of small holes or cracks in large objects. In such instances care must be exercised to have camera and light or lights set at such angles as to obtain good contrast and detail. Holes and cracks usually require sharp side lighting to throw the faults into shadow, thus creating contrast. Where ridges are being photographed, an angle setting of the camera may emphasize them. The best technique for any situation is a matter of experience gained through trial and error. Sometimes it is best to take several shots from different angles and then to select the best negative for printing.

The exposure meter is practically a necessity in this kind of work, but it must be used carefully to avoid false readings. The usual method is to hold the meter close enough to the area to be photographed to catch only the reflected light of that area. Also, the light sensitive part of the meter should be shaded from any strong side lighting. Dulling of the surface of the object being photographed with putty is helpful in avoiding bright reflections into the camera lens.

By far the largest amount of the photographic work done at Southland has been in connection with fiber studies and related subjects. Photomicrographs of groundwood fibers were made during the early operation of the mill in order to compare pine groundwood with groundwood from such a northern wood as spruce. Quality

Photographs of fiber dispersed on a blue glass



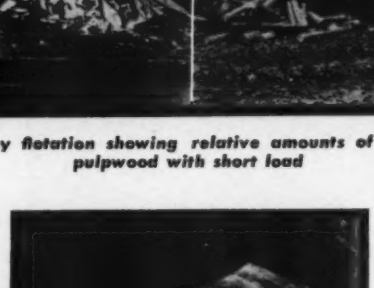
Left—Samples of hogged slabs separated by flotation showing relative amounts of waste and usable chips. Right—Carload of pulpwood with short load

comparisons were made in an endeavor to improve the grinding technique for pine and thus the quality of the paper made by the mill.

The procedure for making these photomicrographs commonly was as follows: Take a small portion of a well mixed sample of the pulp. Place in small dish and dilute with water. Add a few drops of dye (methylene blue). Transfer few drops of thin suspension to clean microscope slide. Put on cover glass and draw off excess liquid. Then place slide on miscroscope slide, focus image on camera ground glass, and photograph.

If the distribution of fibers on a slide was not uniform, several exposures might be made to cover different parts of the slide.

Later, studies were made on the differentiation of fast and slow growth wood, on green and dry wood, on pulp from various parts of the stock system, and on pulp after varying degrees of screening or classification. A series of photographs and photomicrographs were made in an effort to correlate stock quality with specific grinding technique. To produce some of these photographs, a jig was constructed to hold the camera at that distance from the surface of a grinder stone to give a full scale copy of the surface burring. A floodlight was fixed on the jig to give an extreme angular light across the stone surface. The depth of the burr then showed up by the width of the shadows cast, and other details also were made readily visible.



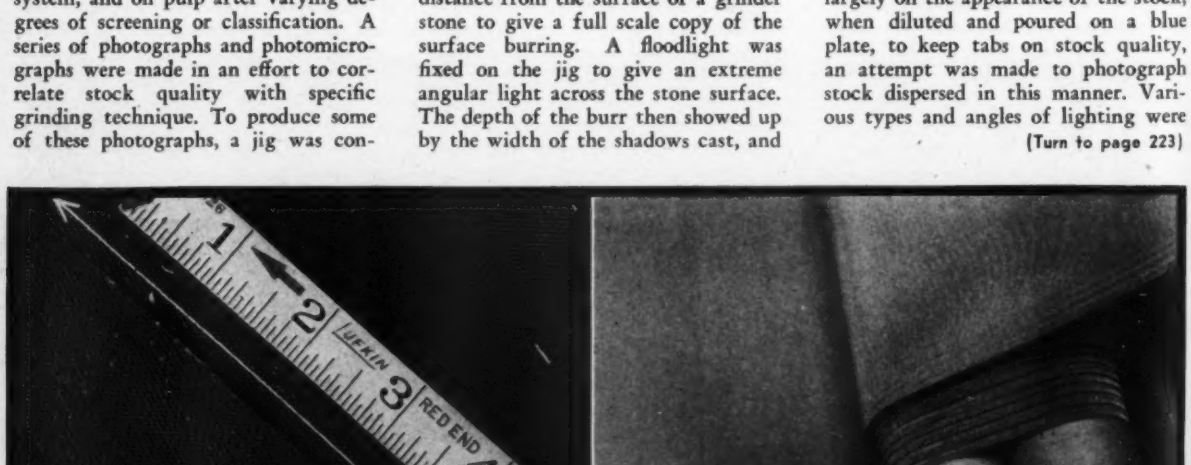
Babbitt bearing with special rig to show grooves worn in the middle

These photographs were taken every few weeks to show the changes taking place in the surface of each of the stones. Along with these photographs, photomicrographs were made of the fiber being produced by each stone; and a report of quality tests, production rates, power consumption and grinding methods was worked up.

Following the preparation of this material for any one run, a comparative study was made of the photographs and report, also with previous data on the same stone and on other stones, to determine the types of surface burring and the grinding methods that gave best all around results. This project which was conducted over a long period of time, greatly aided in the determination of grinding methods.

Since groundwood men depend largely on the appearance of the stock, when diluted and poured on a blue plate, to keep tabs on stock quality, an attempt was made to photograph stock dispersed in this manner. Various types and angles of lighting were

(Turn to page 223)



Left—Slit occurring in the machine direction of a fourdrinier wire. Right—Improperly wound fourdrinier wire. Photo taken in case damage showed up after unwinding

Matthias Koops *Material in the Paper Museum* of M. I. T.

DARD HUNTER, Litt.D.

▶▶▶ THROUGH THE STUDY of old books, prints, documents, and manuscripts it has been possible to arrive at a fairly clear picture covering the history of papermaking and printing in both the Orient and the Occident. Descriptions of papermaking technique and the agelong search for new and additional papermaking fibers extends over a period of almost two thousand years; there are not many steps in the evolution of paper and printing that have not been uncovered and set down in modern books. The work of such Chinese scholars and artisans as Wei Tang, Mêng T'ien, Wang Chieh, Ts'ai Lun, Tso Tzŭ-yi, and Su Tung-p'o is accurately documented in the ancient literature of China and we have a clear conception of the part these men played in the invention and development of writing, papermaking, and printing. In Europe the names of René Antoine Ferchault de Réaumur, Albert Seba, Thomas Greaves, Jean Étienne Guettard, Jacob Christian Schäffer, and Léorier Delisle are familiar to every student of papermaking history; a search in old books and manuscripts reveals ample biographical detail relative to these eighteenth century scientists.

There is one nineteenth century individual, however, who has long remained an enigma to paper historians and only in most recent years has there come to light the real story of his work, but even today we know nothing about the man himself. This elusive papermaker was by name Matthias Koops. The dates of his birth and death remain unrecorded; no portrait of the worthy gentleman exists. Koops was the father of modern papermaking as his mill was the first in Europe to manufacture paper from wood and straw on a large commercial scale.

As a student of the history of paper and papermaking I have long been interested in the discoveries and patents of Matthias Koops, but even more have I been intrigued by the man himself,—his ancestry, his birthplace and childhood, perhaps in Holland; his eventual journey to England, his life and business associations in London, his venture in papermaking and the erection of the largest paper mill in England, and the final failure and bankruptcy of the huge concern which cost "upward of one hundred thousand pounds." It must be remembered that this was a handmade paper mill, established at the very beginning of the nineteenth century, previous to the introduction of the paper machine.

As early as 1912, I had become deeply interested in the elusive Matthias Koops, and while working at the old Finsbury Technical Institute, London, I took the opportunity of trying to acquire additional knowledge regarding this little-known papermaker. After a number of weeks spent in the British Museum and the Great Seal Patent Office I found practically nothing relating to the life of this man. I searched through the files of contemporary newspapers and magazines only to find disappointment. Finally I employed Thomas Giles, a professional genealogical research worker of London and gave him permission to make a thorough and exhaustive search in English and Netherlands libraries with the hope of ascertaining at least a few fragments regarding Matthias Koops. Nothing could be found except, of course, the records of his three patents dated 1800 and 1801; naturally I had long since acquired the three books that Koops had issued these same years. Apparently there had never been any information set down that would throw any light on the life of Matthias Koops or his work in the use of entirely new papermaking fibers on a scale undreamed of previous to the establishment of his great paper mill.

In 1941, thirty years after my search for "Koopsiana" in London, I received a cable from the north of England asking if I was still interested in Matthias Koops. The cable was from an English agent who had for years been on the look-out for papermaking items for my collection. I cabled that I was very much interested in this elusive character and requested that whatever the agent had discovered to forward the material to the United States at once. A few weeks later more than one hundred items arrived, but it is needless to state that the price paid was more than could well be afforded. It has not been possible as yet to properly classify all of the manuscripts, letters, expense accounts of the mill, payroll receipts, bill for materials and labour, inventories and costs of paper, etc. etc. The most valuable documents, however, are the original drafts covering the patents eventually issued to Matthias Koops for making paper from wood, straw, and for the de-inking of printed and written paper. The papers are all in excellent condition and many are held together by eighteenth century, handmade pins.

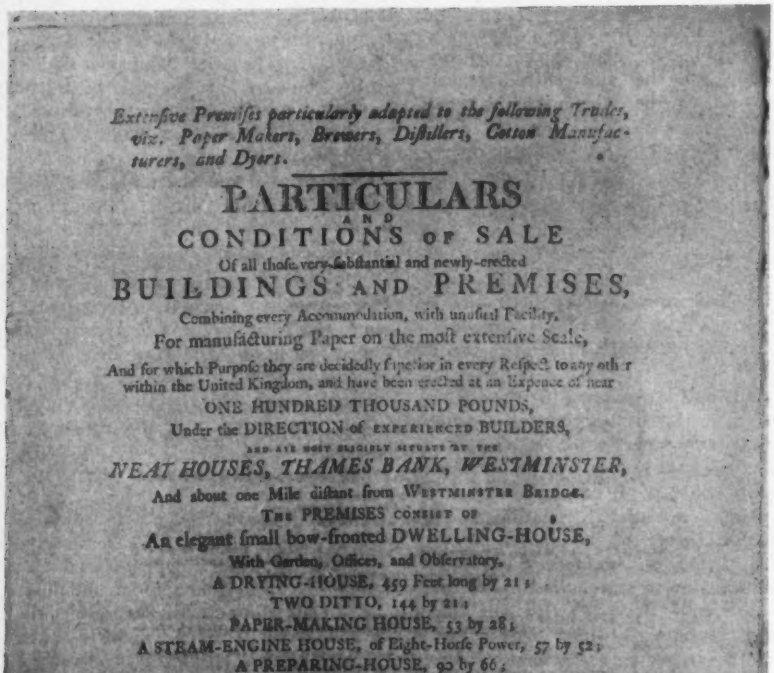
By piecing together this store of information it is possible to reconstruct in a fairly comprehensive pattern the hopes, successes, and final demise, all within a period of three years, of the largest paper mill in Europe up to that time—the mill that was the pioneer in the manufacture of paper from wood and straw on a large commercial scale.

It will not be feasible to enumerate even a portion of the newly-acquired Matthias Koops material, but from the several lists of stockholders it is not difficult to determine the amount of stock controlled by Mr. Koops and his associates. The earliest list of stockholders in "The Straw Paper Manufactory" is not dated, but the paper upon which it is written bears the watermark "C PATCH 1801," and the mill, no doubt, had its inception sometime during that year. The original group of shareholders in the Koops paper mill embraced 23 names, including: Matthias Koops, James Street, Westminster; Dr. Stevenson, Howland Street, Westminster; John Hunter, Charges Street, Picadilly; James Hunter, Catharine Street, Tower Hill; Samuel Lister, Norfolk Street, Strand; Edward Ravencroft, James Forbes, Nassau Street, Soho, Upper Hadley Street; Wm. Tate, Neat Houses, Mill Bank, Tothill Fields; the latter three men were apparently the principal sponsors of the inventions of Matthias Koops as they are mentioned in many of the transactions. In the earliest group of stockholders Koops's name heads the list with 356-2/3 shares of the total number of one thousand shares.

A new building was erected to house Europe's first paper mill in which materials other than linen and

cotton rags were to be used on an extensive commercial basis. From the old mill documents we find that the stone for the foundations of the building was transported from Scotland at a cost of £150 17s. 4d.; the tile and brick were locally manufactured. One item of timber used in the construction of the mill is set down in the expense account as costing £44 5s. 1d., while Thomas Terry, a carpenter, received 700 pounds for his labour. J. Nichols, a bricklayer, was paid 500 pounds and the pipe-fitting and plumbing in the mill came to £354 17s. 6d. From these figures it may be seen that the building for the Koops mill was of considerable proportions, larger than any other paper mill in England up to that time.

Even more enlightening are the costs of the equipment of the mill and we find dozens of papers listing these items in detail: There was a "4-horse chain-pump, complete, for the large well" at 200 pounds and two smaller pumps at 50 pounds each. The wooden vats were evidently purchased in sections, for the entry covering these essential handmade paper appliances reads: "20 Vats for Papermakers, all ready to be put together in our own carpenter shop." The vats cost 45 shillings each. The pressing of the newly formed paper was originally done by the use of "6 screw-presses, iron work all complete" at 15 pounds for each press. The lay-stools, upon which the paper was stacked after pressing between the felts, were purchased at two shillings and six-pence for each wooden stool. For forming paper at as many as twenty vats a large number of moulds of various sizes would have been required and these are listed as costing £238 10s. 0d., while the hand-woven felting upon which the individual sheets of newly made paper were "couched" amounted to £93 10s. 9d. For drying the paper there were 450 "tribbles" at two shillings and six-pence each; cow-hair ropes, also used in drying paper, came to £5 15s. 8d. There are listed "14 small fools' cap press-boards" at 24 shillings the dozen and "12 dozen double fools' cap press-boards" at 30 shillings a dozen. These smooth boards were used in plating, or finishing, the paper. For work around the mill "two old black horses" were purchased for the sum of eight pounds sterling and there is an entry "for horses oats from L. Turney, £3 7s. 0d."



Extenſive Premiſes particularly adapted to the following Trades, viz. Paper Makers, Brewers, Diſtillers, Cotton Manufacturers, and Dyers.

PARTICULARS
AND
CONDITIONS OF SALE
Of all thoſe very ſubſtantial and newly-erected
BUILDINGS AND PREMISES,
Combining every Accommodation, with unuſual Facility,
For manufacturing Paper on the moſt extenſive Scale,
And for which Purpoſe they are decidedly ſuperior in every Reſpect to any other within the United Kingdom, and have been erected at an Expence of near
ONE HUNDRED THOUSAND POUNDS,
Under the DIRECTION of EXPERIENCED BUILDERS,
AND ARE MOST ELIGIBLY SITUATE AT THE
NEAT HOUSES, THAMES BANK, WESTMINSTER,
And about one Mile diſtant from WESTMINSTER BRIDGE.
THE PREMISES CONSIST OF
An elegant ſmall bow-fronted DWELLING-HOUSE,
With Garden, Offices, and Obſervatory.
A DRYING-HOUSE, 459 Feet long by 21;
TWO DITTO, 144 by 21;
PAPER-MAKING HOUSE, 53 by 28;
A STEAM-ENGINE HOUSE, of Eight-Horſe Power, 57 by 52;
A PREPARING-HOUSE, 90 by 66;
A DITTO, 106 by 20;
AN ELABORATORY, 60 by 27;
A capital Twelve-Stall Stable, Engine-Houſe, Cart-Houſe, Porter's Lodge,
[redacted]
A CANAL, cut from the River, communicates to the different Buildings, and gives eaſy Acceſs to the Barges, 379 Feet long and 68 wide;
Three Wells of fine Water, [redacted]
The whole incloſed with a high Oak Paling, and good Road:
Held under Lord GROSVENOR, for a Term of 67 Years from Midſummer laſt, at the very ſmall Rent of 100l. per Annum:
WHICH WILL BE SOLD BY AUCTION,
By MESSRS. ROBINS,
At GARRAWAY'S Coffee-Houſe, Exchange-Alley, Cornhill,
On SATURDAY, SEPTEMBER 21, 1804, at Twelve o'Clock,
IN ONE LOT.
Deſcriptive Particulars may be had Thirty Days prior to the Sale, at the principal Inn in every manufacturing Town in England; and Plans of the Eſtate ſeen at Mr. LISTER'S, Solicitor, No. 4, Norfolk-Street, Strand, and at Meſſrs. ROBINS'S, Great Piazza, Covent-Garden.
The alphabetical Letters in the Margin refer to the Plans.

The cover of the rare eight-page catalogue, dated 1804, offering the Matthias Koops mill at auction. After an expenditure of almost one hundred thousand pounds the paper mill failed following only about three years of operation

The stockholders, aside from Mr. Koops, advanced 45,000 pounds for the "buildings, machinery, and utensils." The deed of corporation was made February 26, 1801. On March 27, 1802, Matthias Koops received 50 additional shares of stock from the holdings of William Tate, and a short time afterward 10 shares of Koop's stock passed to Dr. James Stevenson, one of the original stockholders of the company.

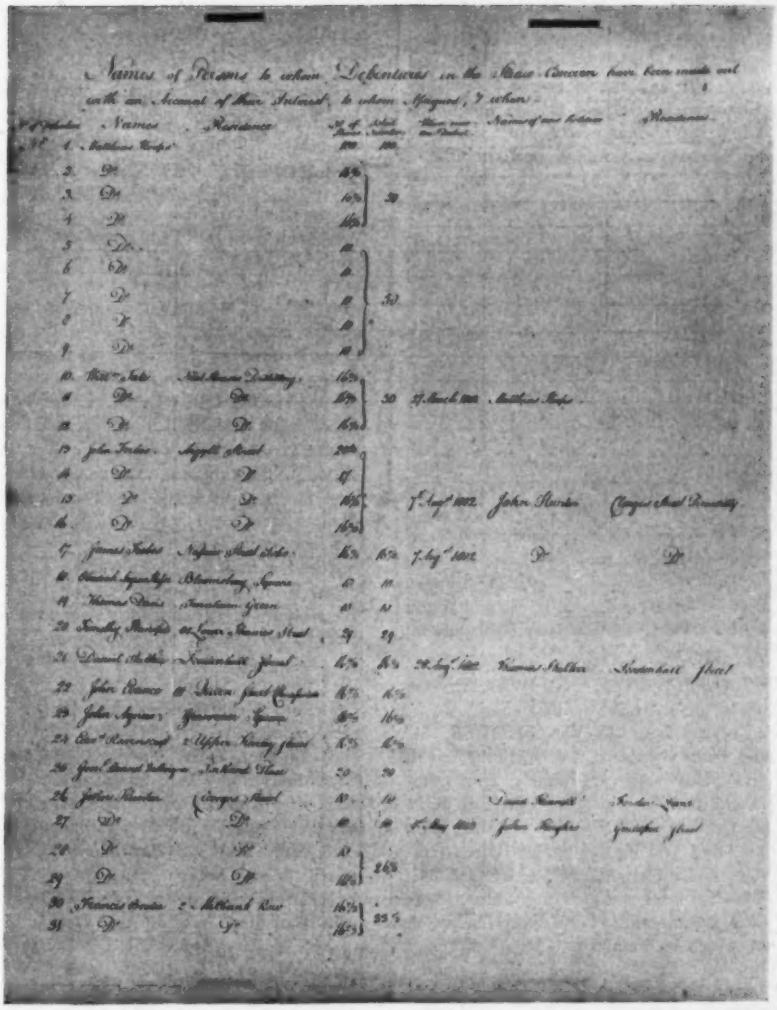
From the old accounts we learn that considerable paper was made and sold, but evidently not a sufficient amount to prevent the ultimate financial rupture of the enterprise, for in less than three years of activity the company went into bankruptcy with debts of 10,500 pounds; the complete assets of the company were listed on November 11, 1802, at 3,500 pounds. Then began the pathetic breaking up of the mill; the cries of the disgruntled workers were heard on every side. In one letter dated December 6, 1802, from the former papermakers they state that since the mill has ceased to function "a great number of wet packs of paper are spoiling in the vat-

house and the pulp is rotting in the vats. We should be happy to be informed of your determination as our discharge is our misfortune and not of our own seeking." This letter is signed: "Your very obedient, though distressed, servants." On December 20, 1802, another letter of grievance from the "distressed" papermakers reached the stockholders. In this two-page communication the erstwhile employees made additional complaints and among other things stated that, "each of us in entitled to the sum of 2 shillings and 6 pence for our Christmas dinner, and we trust your own honour, humanity, and feeling will cause our little demand to be discharged without the necessity of appealing to the assistance of the law which being impartial to rich and poor will, we have not the least doubt, be in our favour." This second and last letter from the disgruntled papermakers is signed: "Gentlemen, your late Servants at the Paper-mills." At least one of the buildings of the paper mill was evidently dismantled, for under a list of assets to provide payment of debts we find 200,000 second-hand brick and 5,000 tiles. Also a quantity of pot-ash to the value of 100 pounds is listed, as well as paper worth 80 pounds, which was on the premises. Even the two old black horses are entered as assets of the defunct paper company; a later document sets down that these two faithful beasts eventually sold for seven pounds three shillings.

Apparently the Koops mill did not produce paper after the end of the year 1803, and while a few odds and ends were sold, the main buildings and equipment remained intact. After considerable litigation the premises were sold at auction, but no records exist relating to the outcome of the auction or the final disposition of the huge property.

One of the most interesting documents in the "Matthias Koops papers" is an 8-page printed catalogue of the auction sale; the original date for the disposal of the property was set for September 22, 1804, but the date was changed to October 27, 1804, at Twelve o'clock. The auctioneers were Messrs. Robins and the sale was held at Garraway's Coffee-House, Exchange Alley, Cornhill, London. The paper upon which this auction-sale catalogue is printed is watermarked "LEWIS MUNN 1801."

In as much as the catalogue gives a complete description of the various buildings and much of the equipment the contents of the list will be set down in full:



One page of a two-page list of the stockholders in the Matthias Koops "Straw Concern." It will be noted that the name of Koops heads the list. This is one of four different lists of stockholders of the Koops paper mill in the Paper Museum of M.I.T. collection

"Particular and condition of Sale of all those very substantial and newly-erected BUILDINGS AND PREMISES, Combining every Accommodation, with unusual Facility, for manufacturing PAPER on the most extensive Scale, and for which purpose they are decidedly superior in every respect to any other within the United Kingdom, and have been erected at an Expense of near ONE HUNDRED THOUSAND POUNDS, Under the direction of experienced builders, and are most eligibly situated at the NEAT HOUSES, THAMES BANK, WESTMINSTER, and about one mile distant from Westminster Bridge . . . The premises consist of an elegant small bow-fronted DWELLING-HOUSE with gardens, offices, and observatory; A DRYING-HOUSE, PAPERMAKING HOUSE, A STEAM-ENGINE HOUSE, of Eight-Horse Power, A PREPARING-HOUSE, AN ELABORATORY, A capital Twelve-Stall Stable, Engine-House, Cart-House, Porter's Lodge, A Substantial FOUNDATION for the erection of a Steam-Engine of Eighty-Horse Power; A Canal, cut from the River, communicates to the different Buildings, and gives access to the Barges, 379 feet long and 68 wide; Three Wells of fine Water, Pump, etc., The whole enclosed with a high Oak Paling, and good Road. Held under LORD GROSVENOR, for a Term of 67 Years from Midsummer last, at the very small Rent of 1000 pounds per Annum.

"The Estate consists as follows: On the south-east corner, a modern substantial new-built Bow-fronted DWELLING-HOUSE, three stories high, and contains an Observatory, and flat lead roof, commanding to the south, Extensive and variegated Views of the Surry Hills and Part of Kent, To the East and West, the picturesque and moving Scenery of the

Thames, and a North view over the Metropolis, and Highgate and Hampstead; On the second floor, a large cheerful airy Bed-Chamber; first floor, a well-proportioned Drawing-Room, communicating to a circular balcony, and bow windows to the ground, statuary marble chimney-piece; a back Drawing-Room, with two closets, Patent Water-Closet, fitted up in Mahogany; ground floor, a Large Accounting house; a back Parlour and closet prepared for a Strong room, kitchen, and larder; basement, a Housekeeper's room, Butler's room, Pantry, Scullery, and Wine-Cellar, with an Abundance of Conveniences, a neat Entrance-Hall, and handsome staircase, with Mahogany rail; large Garden, walled, and a handsome lofty iron railing fronting the Thames, which leads through an iron door to the ELABORATORY or BLEACHING-HOUSE, 60 feet long and 27 feet wide; a Lubber-boarded Lanthorn at the top of the roof, capacious cellaring under, and above to capital coppers, fixed in brick and iron work, containing eight barrels each, with pumps fixed, and lead pipe to the Well.

"A STEAM-DRYING HOUSE, fitted up in the most substantial manner . . . . A very Capital DRYING-HOUSE, Sol and Finishing Room, 144 feet long by 21, and fitted with ten double and single new PRESSES, by the ingenious Engineer, Mr. RENNIE, with finishing, parting, and picking tables, lay-boards, etc.; An excellent airy DRYING-ROOM over 144 feet long with sliding Shutters and Trible Rails and Hair Lines. The whole of which is drained and compleatly kept dry by Brick Sewer, 546 feet long and 4 feet 6 inches by 2 feet 6 inches in Diameter, which empties itself into the River . . . . A capacious, substantial and newly-erected Manufactory consisting of a Preparing-House, 90 by 66, a Drug-House, Felt Rooms, a Coal-Room, equal to 100 Chaldrons, and a Capital STEAM-ENGINE HOUSE, all of which are fitted up in the best possible manner . . . . for the manufacture of PAPER on a very enlarged plan, in which is erected a most compleat STEAM-ENGINE, of eight-horse power in working condition, with two beating-engines, a brass and iron roller, two oval coppers in brick and iron, to contain 1900 gallons each; two large Liquor Backs, supplied by the Steam-Engine with Spring Water, from an inexhaustible Well . . . . supplied by the River by the Steam-engine, lead pipes communication to the whole, and a Copper Pipe from the Engine to the Liquor Back; a CHAFF-CUTTING ENGINE, on a superior and improved plan, by Mr. Rennie, and a small room over; A BEATING-ENGINE HOUSE, and room adjoining with three stuff-chests, of large dimensions, lined with lead, brass cocks, and lead pipe, which communicates with the PAPERMAKING VATS.

"Contiguous to the steam-engine is A PAPERMAKING HOUSE, 53 by 28, with two wet presses, prepared to be worked by the steam-engine, with four vats, lined with lead, pot holes, and four hog wheels, supplied by a large lead pipe with spring and Thames Water, and a Felt-washing House, supplied with waste Water from the Steam-Engine; On the West Side is a DRYING and SIZING HOUSE, 144 Feet long by 21, With two large Coppers, 9 and 6 Barrels each, A sizing Press, A large Sizing Vat and smaller ditto, with Brass Cock and Lead Pipe, Divided by four stout Deal Partitions, And communicating by two Staircases to A DRYING-ROOM above, With treble Rails and Hair Line, and sliding Shutters, 144 Feet long; The Centre BUILDINGS consist of A capital Twelve-Stall Stable, Cart-Shed, Five Privies, and A most excellent Turret Clock by Twaits, of Clerkenwall, With 110 Feet of Ground, enclosed with Railing, And Four Lamp-Posts, Irons, and Lamps; On the North West Side is a singularly convenient DRYING-HOUSE, (The largest and most compleat in the Kingdom) 459 Feet long by 21, Divided on the Ground-Floor into Seven Compartments by Wood Quartering, And lined with finished Deals on both Sides, and Sash Windows, Communicating with a Staircase at each extremity to A DRYING-ROOM above, 459 Feet long, With sliding Shutters on each Side, and no Partitions; On the South West Corner of the Estate is A GOOD BRICK DWELLING-HOUSE, with Cart-Shed, &c. In the Occupation of Mr. Watkiss; A SMALL DWELLING, Occupied by Mr. Cook; and TWO DWELLING-HOUSES, With small Gardens, Fronting the River, In the Occupation of Messrs, Rummings and Louth; A DITTO contiguous, Let to Mr. Cooper, All Tenants at Will; and a Shed used as a Horse Wheal and Chain Pump; In the Centre of the Estate is a most capital Foundation for the Erection of A STEAM ENGINE, of Eighty-Horse Power, 180 Feet by 58, Executed in Parker's Cement, And the Foundation cut up in Grains, And universally acknowledged to be the most compleat and substantial that ever was made, And cost upwards of SIX THOUSAND POUNDS, and a fine Well contigous 16 Feet deep and 25 Feet in Diameter, Bricked round in Parker's Cement. A CANAL has been cut from the River to the Manufactory, At an Expense of near SEVEN THOUSAND POUNDS, And gives easy access to Craft of considerable Burthen. The Estate consists of Fifteen Acres of CHOICE LAND, (Little more or less) and contains East—1038 Feet 6—West 716 Feet—North—779—and South upon the Thames—920 Feet; Of which, independant of the Ground occupied by the Manufactory, Buildings, &c. Will leave to build on (and for which Purpose it is very eligible, particularly that facing the River, and commanding Fine variegated Views of Part of the Counties of Surry and Kent). To the East—1038 Feet 6—West — 716 Feet — North—779 Feet — and South—860 Feet, and Ninety Feet of back Ground to the whole. In the Centre of the ESTATE there will remain upwards of SEVEN ACRES of CHOICE GARDEN-GROUND, Calculated either for the Erection of a Manufactory or Building on. There is a RIGHT of ROAD surrounding the PREMISES, Attached to this Property, And for the Use of which the Tenants of the Right Honourable the Earl of Grosvenor pay to the Proprietors of the Concern a yearly Sum of TWELVE GUINEAS. The Estate is enclosed on Three Sides by a close Fence, 9 Feet high, Inch and a Half thick, and protected with Oak Posts, and Plint, planed on both sides and painted, And the other side fronts the River; Possesses With the Consent of the Dean and Chapter of Westminster a Road over Tothill-Fields, affording A direct Communication to and from London, Without the expense of Turnpikes or Weybridge. The Whole of these extensive Buildings and Manufactory, And which are decidedly superior to any in the United Kingdom for a PAPER-MILL, have been erected under the immediate Direction of a Committee of the Proprietors and skilful Workmen; Are composed of the best materials, Regardless of every expense to render them compleat, and cost near ONE HUNDRED THOUSAND POUNDS, (more or less) And are now to be submitted To the Protection of the Public, Unattended with any Reserve . . . . May be viewed Thirty Days prior to Sale, and Particulars had on the Premises, and the principal Inns in every manufacturing Town in England; and plans of the Estate seen at Mr. LISTER's, Solicitor, No. 4, Norfolk-Street, Strand, and at Messrs. ROBIN's, Great Piazza, Covent-Garden. London."

From a reading of the auction catalogue it is obvious that the Matthias Koops paper mill was of great size and had been built and equipped without regard to cost. The outlay of nearly $500,000 for a handmade paper mill as early as 1800 was indeed a gigantic expenditure; no other paper mill in Europe at the time had buildings of the proportions specified in the sale catalogue. According to the inventory of equipment the power for the mill was furnished by "a most compleat Steam Engine of eight-horse power," but the hopes and aspirations of the mill owners for still further development is evidenced by their expenditure of six thousand pounds for the erection of a foundation for a steam engine of eighty horsepower, ten times the amount of power they

originally produced. This was probably the first paper mill in England to be operated by steam.

As has been previously stated, the purchaser of the mill is not known, but it is doubtful if the buildings were again used for the manufacture of paper. In one of the documents relating to the Koops mill it is suggested that in the event of failure the paper mill property would be "extremely well calculated for a Brewery, Distillery, Cotton-manufacture, or Dyer," so it may be assumed that the large group of substantial buildings was eventually used for one of these industries. •

With all of the additional material that has come to light dealing with the pioneer mill in the manufacture of paper from wood and straw on a large commercial basis, we still have no information relative to the patentee in the use of these materials—Matthias Koops. It is hoped that there may be future discoveries of documentary material that will at least reveal the date of the birth of this most elusive individual; also it is hoped that an authentic portrait of the worthy Koops may be unearthed as it would indeed be satisfying to be able to visualize the features of the man to whom the modern papermaking industry is so greatly indebted.

Illustrations are from "Papermaking, the History and Technique of an Ancient Craft," Alfred A. Knopf, Inc., publisher, New York City

Photography . . .

(Continued from page 219)

tried with partial success. Unfortunately, the study was terminated before details had been worked out. However, it is believed that there is value in the idea, especially if an unusual stock is being produced. Photographs of the stock in suspension could be compared with photomicrographs of the fibers and perhaps from this comparison a procedure for more rigid control of the grinding technique could be worked out.

Studies of sulphate pulp — which pulp was purchased until Southland established its kraft mill in 1944 — were made largely to determine effects of various techniques of beating or refining. A new type of refiner and an ordinary jordan were used in some of the experiments. Photomicrographs were made of the fibers before and after treatment in one or the other of these machines. Not only were these photomicrographs studied to determine degree of brushing out of the fibers; but also they were compared with physical test data on the pulp.

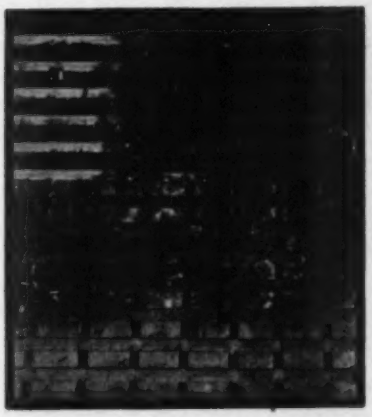
Fibers from different woods have been photographed as have fibers from other types of cooking to permit comparison with ordinary pine sulphate.

Several photographs have been taken of finished sheets of newsprint by contact printing. These prints were made in order to compare the formation of pine newsprint with newsprint from other mills.

Other photomicrographic work done at Southland has included photomicrographs of starch sized paper using iodine stain to show dispersion of starch grains, and photomicrographs of bacterial cultures to serve as records and also as an aid in the identification of the various bacteria. The photomicrographs of the cultures, utilizing a green filter to obtain sharper definition, were of the magnification 1620X. The cultures resulted from bacteriological investigations in connection with the control of bacteria in the mill and with waste disposal work.

Many photographs of miscellaneous subjects also have been taken. In the laboratory, photographs have been used to record experimental setups, wood chip sizes (comparative), crystals of experimental by-products and many other items. They also have been taken to be of interest or aid to other departments of the mill or for authorized outside interests seeking special information.

Construction progress photographs also have a very definite place. They record how a construction project is handled, starting with the breaking of ground and continuing at intervals until the project is completed.



Inside surface of stator of 4,000 hp. grinder motor showing where segment had burned out

Photography such as has been described can be of great value to any pulp and paper mill. It is very inexpensive and generally someone in a mill organization is capable of handling it as a part-time activity.

Lithographic Papers

▶▶▶ The application of a technique that was successfully used in the development of paper for war maps is involved in a basic study of lithographic paper now in progress at the National Bureau of Standards.

Paper is a thin felting of fibers normally held together by invisible bonds of a water-sensitive gel formed on the fiber surfaces by mechanical beating of the fibers in water. Substitution of insoluble bonds of synthetic resin for the gel bonds shows promise of leading to important advancement in printing papers, particularly those for multi-color offset lithography.

Objectives include the conservation of basic raw materials by permitting the increased use of widely available short-fibered pulps, and improvement in the performance of papers in printing.

By the experimental manufacture of papers in the Bureau's semicommercial mill, information is being obtained on:

(1) The extent to which papers of the usual fiber compositions can be improved as regards expansion, curling, and linting by resin bonding instead of gelatinization by beating.

(2) The possibility of using a greater proportion of short resilient fibers that improve printing qualities, but do not develop suitable sheet strength by gelatinization.

(3) The feasibility of making lithographic papers wholly or in part from newly-developed deciduous wood pulps for better utilization of our wood resources. Preliminary results have indicated great potential value of the resin bonding.

This investigation represents a resumption of cooperative work with the Lithographic Technical Foundation which was interrupted by the war. As before, the Foundation has set up an advisory committee comprising representatives of the lithographic printing industry and also representative of the manufacturers of paper and raw materials for paper. The advisory committee not only serves for the guidance of the work but also is in a position to put the findings into immediate practical use.

Flow Sheets

in Pulp and Paper Mill Design

EDWARD T. JONES, Paper Mill Engineer
Chas. T. Main, Inc.

▶▶▶ DUE TO THE WAR the paper industry has been prevented for six years, from putting into effect many plans for plant improvement and expansion. The industry is now entering into a period of development and expansion that will require the most careful study by management, operators and technicians. The ultimate coordination of this thinking is one of the functions of the engineer.

Before any detailed designs can be intelligently drawn up or satisfactory equipment selected, there must be a very definite statement of the general problem. The scope of the work as well as the objectives anticipated should be well understood. These all require preliminary studies to assist in determining the practicability of various schemes. Probably the most workable and understandable device available to the engineer is the flow sheet.

There is nothing unique in the preparation or use of flow sheets in the study of a process. They may be as simple as a newspaper sketch showing the route of the next day's parade for the visiting eminent personage or as complicated as an outline of a complex chemical plant. They are used every day to explain an idea or scheme. Some go into almost photographic detail while others, as in electrical layouts, make use of conventional symbols, which are difficult for the mill operator to follow. Paper and pulp mill flow sheets are constantly being published to illustrate particular developments. Their use in the planning of extensions or improvements has been found to be of the greatest value in clarifying and developing the ideas of those responsible for the development of a project.

Much valuable time and effort can be wasted in the preliminary stages of a project, if an attempt is made to develop actual layouts with no clear understanding as to the limitations of the project. It is during this period that properly executed flow sheets will prove much more desirable than actual plans. The flow sheet offers a simple method for the study of an operation and, at the same time, confines any discussion to the main items of equipment. Irrelevant details will not consume the time of the conferences.

The engineer's main problem in the preparation of a flow sheet is to determine how much detail should be included. This depends upon the progress that has been made in deciding upon the process. Every essential piece of equipment should be shown with the main stock, white water, fresh water, steam and chemical flows. In the preliminary stages it may be impossible to assign definite quantities to these flows. However, these quantities will soon begin to crystalize and estimated values should be added as rapidly as possible.

The flow sheet should be more than an approximation of the equipment. As far as possible the various items of equipment should be shown in their relative positions and sufficiently detailed so that they can be recognized readily. Some attempt to keep it to scale is helpful, especially to the members of the operating staff. Nor should the drawing be at too small a scale. For the wet end of a paper machine, including a simple stock preparation system, a 24 in. x 40 in. drawing will be none too large. This will give room to sketch in possible variations during discussions and to include pertinent notes brought out in conferences. The use of black and white prints is recommended. Colors are confusing and are desirable only for very complicated flows.

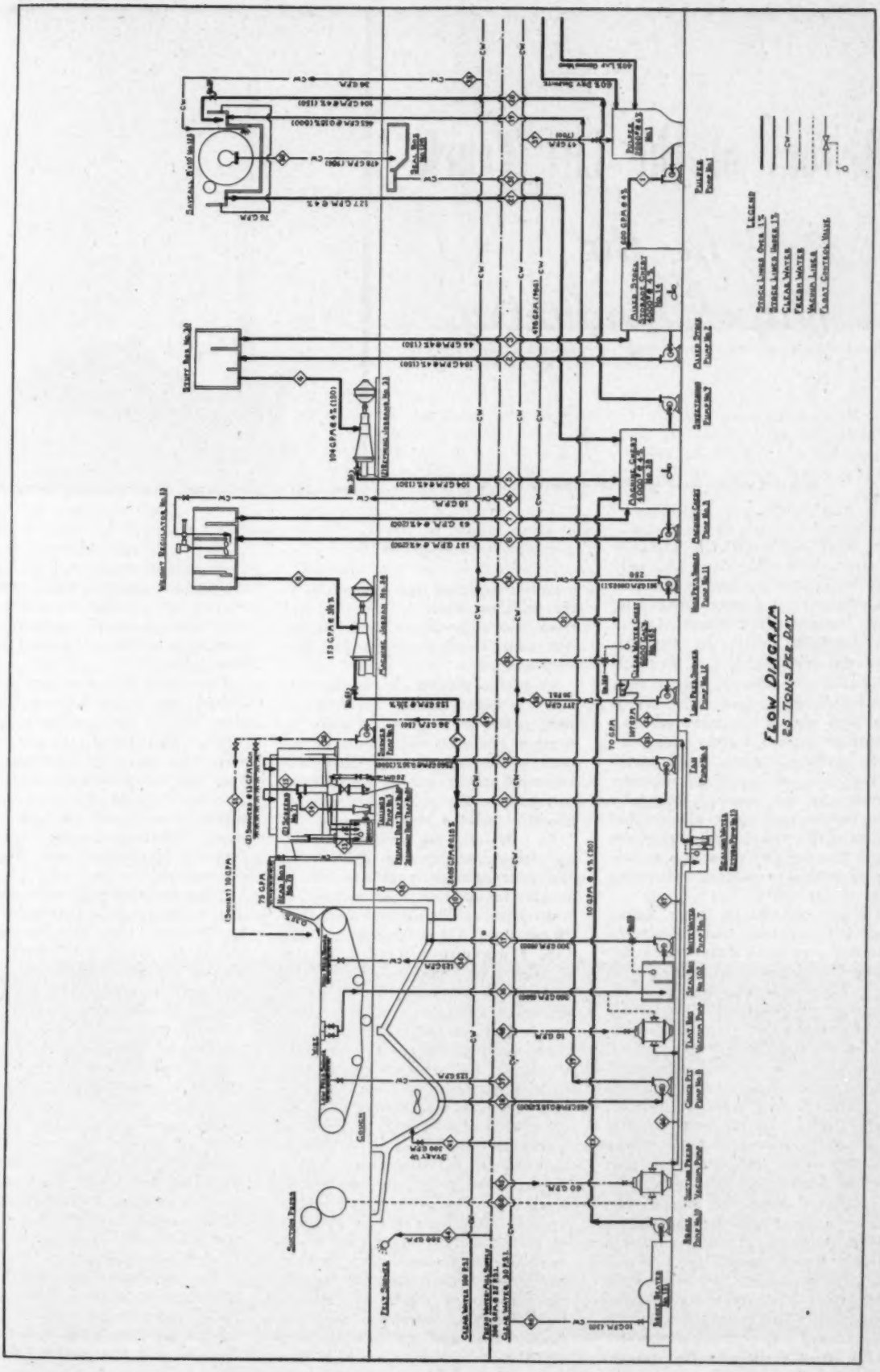
Throughout the preliminary studies the flow sheet will be subject to constant revision. Finally, however, the practicability of the various schemes will have been determined and a workable process developed. By now it should also be possible to start preliminary layouts of the actual project. All quantities should be available and as the data is to be used for design purposes both the theoretical and design or maximum quantities should be shown. Special valves, controls, etc., will be included. Copies of all preliminary flow sheets should be retained as a record of the development of the design.

The actual layout of the project is now possible and the final flow sheet will be the basis of all layout work. If the preliminary studies have been well and thoroughly done, there will be no question as to the desirability of proceeding with the project, and the design work will be greatly facilitated.

But the flow sheet in itself now needs to be supplemented with a more complete list of equipment. Unless this is done at this time, it will become increasingly difficult to coordinate all of the details of design, specifications, purchasing, etc. The equipment list will serve as a concise record of orders placed, prints received, and, finally, record the shipment of each item. Each item should be assigned an equipment number, and this should now appear on the final flow sheet. The various pipe lines can be assigned numbers, as well as the pumps, chests, etc. The theoretical quantities should be carefully rechecked and the entire flow brought into exact balance.

Such a flow sheet, which was used as a reference throughout the design is illustrated on the opposite page. This incorporates the elements mentioned above and was used as a basis for the selection of equipment, pump and pipe lines, etc. It will be noted that two quantities are shown on each line of flow. The quantity in parenthesis is the anticipated maximum flow under any conditions and was used for the selection of pumps, sizing of pipe lines, wires, chests, etc. While some items are out of scale to allow showing of detail, the layout does show the relative location of all units and in this case the operators were able to visualize the ultimate layout and intelligently discuss their ideas and requirements.

Engineers with paper or pulp mill projects in view will be well advised to make use of flow sheets for project studies. When carefully made they will be found to be of great value, not only during the preliminary studies of a project but as a guide in the ultimate design and operation of the plant.


FLOW DIAGRAM
85 TONS PER DAY
LEGEND
STOCK LINES OVER 15
STOCK LINES UNDER 15
CLEAR WATER
FRESH WATER
WASTE LINES
CABLE CONTROL WIRE

History of the Lift Truck in the Paper Industry

Original Cowan hand lift truck—capacity 500 lb.

T. F. MORIARTY

▶▶▶ THE LIFT TRUCK SYSTEM for materials handling dates back only to 1910. In that year and in Holyoke, Massachusetts, a paper converting plant superintendent named Cowan was dissatisfied with the way flat paper was being handled in his plant.

New to the industry, only a short time before having been with a textile mill, and not an engineer, yet mechanically inclined, Cowan studied his paper handling problem as well as the various types of handling equipment generally in use. Out of this study came his idea for a truck which would be used with a sort of loading platform —the two together providing an improved method of moving and storing paper.

He put his idea on paper, rather crudely to be sure, and turned the drawings over to his master mechanic, George Taylor, who had built some of the machinery being operated in the plant, and who found no great trouble in putting together a workable truck that would roll under the platform loaded with paper and then by manipulation of the truck handle downward would lift the load from the floor. A simple locking device kept the load in elevated position, thus permitting one man to move the stacks of paper over the floor to a designated point.

For loads under 300 pounds, this truck, equipped with 4-inch diameter wheels, worked quite satisfactorily—in fact, it was possible for one man to pull a 500-pound load without too much trouble. A 500-pound load was considered a good one-man load in those days.

The truck and platform arrangement was operated for one month in the plant of White & Wyckoff, and from the observations made during that time, the following conclusions were reached:

1) It is possible to eliminate as many as eight manual handlings of sheet paper by keeping the stock on wooden platforms from time of receipt at the mill, through the manufacturing stages, and to the shipping room where the packaged sheets are placed in wooden cases.

2) By following this program and by placing no paper on floor or on shelves for storage, much time can be saved. In addition, the volume of scrap paper can be reduced more than 50 per cent. (It developed that each time a workman grabbed a handful of paper, he could spoil either the upper or lower first sheet by wrinkling, soiling, or tearing.)

3) Heavier loads can be hauled if the wheels of the truck (or trucks) are larger and are fitted with anti-friction bearings.

The decision was made to equip the plant, each of its five floors, with lift trucks and skids and to establish a load limit of 1,500 pounds.

Up to this point, the development of the truck had been strictly a family affair. The main thought had been to get a sufficient number of trucks built and to secure the necessary number of loading platforms to fully equip the plant where the Autocrat line of writing paper was being produced. That goal was achieved early in 1911.

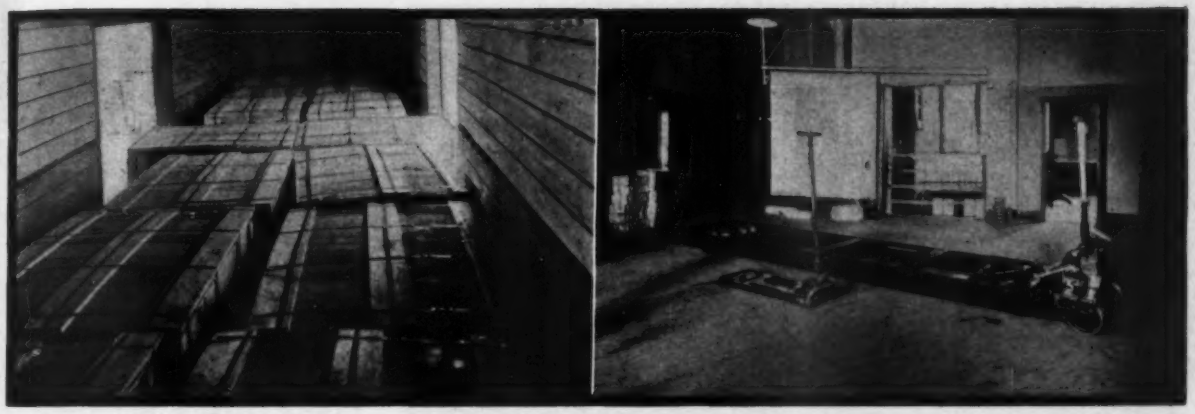
The results proved very satisfactory to both Cowan and Taylor and also to their employer, White & Wyckoff. Up to this time, the development had been given no publicity, yet knowledge of it got around to the local mills.

Those mills in the vicinity that delivered paper to the White & Wyckoff plant were in best position to get the details. This group included various mills operated by the American Writing Paper Company, such as the Gill, Norman, Riverside, Holyoke, Crocker, Albion, Linden and Dickinson Divisions. Whiting, Crocker McElwain, Parsons, Strathmore and Woronoco also were on the list.

These mills through their managers and superintendents convinced White & Wyckoff that the development should be shared with them. They pointed out that Cowan had the opportunity of establishing a manufacturing business that promised good financial returns. These appeals were heeded and the Cowan Truck Company, with White, Wyckoff and Cowan as principal stockholders, was organized in 1911.

The business was started in a very conservative way. A space approximately 50 by 50 feet in the plant of White & Wyckoff was cleared for the new company. Trucks were built in that small space to take care of the orders that came in with little, if any, selling effort.

Two sizes of truck were built at the start. One truck, designated as No. 1, had a lifting frame 14 in. wide by 28 in. long. This truck had a capacity of 1,500 pounds. The other



Left—Carload of skidded paper with lift truck included for emptying car at destination. Right—Pioneer lift trucks were small—now they are built from the size of a pet dog up to an elephant

truck, known as No. 2, had a frame 14 in. wide by 38 in. long. Its capacity was 2,000 pounds.

In the second year of operations, two larger units were added to the line. The smaller of these two trucks had a capacity of 3,000 pounds; the larger, 3,500 pounds.

By this time, the wheels of the two earlier designs had been increased from 4 inches to 6 inches. The wheels of the 3,000-pound and the 3,500-pound trucks had a diameter of 7 inches.

Another design was completed by Cowan within three years. Also, by that time, a couple of new lift truck builders had entered the field. The lift truck had proved itself; and, with its acceptance by the motor car industry, it began to be used widely throughout industry.

In the first few years of the lift truck industry, the task of making a selection of trucks from the list of models then extant was comparatively easy. By 1920, the situation was very much changed. To illustrate—from one design or type built in a narrow and wide frame and in frame lengths of 28, 38, 42, and 48 inches, the models of a typical lift truck manufacturer broadened into the following:

1) A line of single stroke mechanical lift type trucks built in two standard and several special widths, in lengths ranging from 30 to 72 inches in steps of 6 inches (specials up to 144 inches long), and in frame heights of 6, 7, 9, and 11 inches. Wheel diameters of these trucks ranged from 6 inches up to and including 11 inches; while wheel types included steel, semi-steel, rubber-tired, wooden, and canvas-tired.

2) A line of multistroke mechanical lift type trucks requiring four or more downward strokes of the handle to elevate to full height (usually 3 inches).

3) A line of hydraulic multistroke trucks with lifting and lowering operations controlled by a hydraulic pump.

As time went on, with the capacities of hand trucks increasing from 2,500 to 3,500, to 5,000, and then to 10,000 pounds, larger wheels became necessary. Wheel diameters jumped to nine inches with the development of the 5,000-pound truck; to 11 inches, with the 10,000-pound model.

Today, there are a limited number of hand-operated lift trucks with a capacity of 20,000 pounds. Since an average husky man can pull a 5,000-pound load, it is fair to assume that the 10-ton capacity trucks require four to five men to handle a load.

Many of the trucks with 6-inch diameter wheels, made during the early days of the industry, are still in use. To change over the skids used with these trucks to permit the use of trucks with larger wheels is an overwhelming task. Nevertheless, to do so where the loads handled exceed one ton would be a boon to industry.

During the 1920's, the U. S. Bureau of Standards launched a cam-

Left—Paper mill storeroom. Flat stock prepared for shipment on skids. Right—Well packed shipping skid loaded with paper

Pulp bales being handled on skids by electric truck. Truck is of 10,000 lb. capacity; it has an over-all height of 110 in. and a maximum platform height of 84 in.

paign to standardize the sizes of skid platforms for shipping by rail and truck. The Bureau recommended two skid platform clearances, 8 inches and 12 inches. Trucks equipped with 7-inch diameter wheels would handle the first size; trucks with 11-inch wheels, the others.

Battery-operated trucks were in use in manufacturing plants previous to Cowan's development of the lift truck. These power-driven trucks, however, were load carriers and had no lifting mechanism of any kind.

In 1916, Cowan and other truck builders advertised electric lift trucks with a capacity of 5,000 pounds. These trucks fitted in where there were long hauls, heavy loads, and volume sufficiently large to require their continuous operation.

The need for a better method of handling rolls of paper was observed as early as 1915. Generally, at that time, rolls of paper, with the help of chain hoists for lifting, were transported by means of dollies, stevedore trucks, or load carrier electric trucks.

About that time, an engineer named Pope, invented a clever roll handling electric truck. This truck had a two-piece, round-plate, roll handling device located ahead of the operator. The device straddled the roll and was clamped around it by pulling a lever. Another lever controlled the lifting mechanism which raised the roll from the floor and thus permitted it to be hauled to destination.

This truck proved to be another step forward. It was the forerunner of many other designs of straddle trucks originated for the paper industry and which drifted into other materials handling applications. For years it brought dividends to the Missiquoi Pulp and Paper Company, of Sheldon Springs, Vermont, and also from a later date to other firms.

Many paper mills and paper converting plants are content to get along with the high lift fork type elevating truck for picking up, transporting, stacking, and unstacking rolls of paper.

With these improvements in the handling of paper within the mills and paper converting plants came improvements in getting paper to paper merchants, printers, and other consumers. These improvements, spearheaded by the paper industry, and assisted by engineers with the firms manufacturing trucks, resulted in the shipping of paper on skid platforms and pallets via railroad cars, boats, and motor trucks. This method for transporting paper has been in use since 1925 and perhaps longer on a small scale.

One of the paper mill organizations which pioneered this method of shipment is the West Virginia Pulp & Paper Company. Today, the demand to ship goods on skid platforms or pallets is widespread.

Profiting by the experience of the paper industry, tin plate mills made a radical change in their method of shipment. For years, it had been the practice of such mills to package tin plate and to place the packages on the car floor. This method of shipment meant a back-breaking and time-taking job of unloading at destination. Under the present arrangement, a number of packages of tin plate are strapped on a pallet for delivery and thus a carload can be unloaded with a lift truck in only a few hours as contrasted with one and one-half to two days which were required to unload a car by hand.

The pioneer in shipping on skid platforms was a comparatively small sulphite pulp mill, located at Mt. Tom Junction, Massachusetts, only a few miles above the plant of the Cowan Truck Company. As early as 1915, the pulp mill loaded its laps of pulp on wooden skids and shipped them in this manner to New England paper mills.

Some of the paper mills did not own a lift truck. The pulp mill, therefore, arranged with the Cowan Truck Company, for the loan of a truck for each car where required to expedite unloading of pulp at destination. Usually, a mill convinced of the time saving possibilities in the use of the truck asked to be billed for it.

The skids used by the pulp mill were of the returnable type. Customers were expected to ship them back to the mill after enough empties had been accumulated to make an economical shipment. The railroads cooperated at the time by allowing a low rate on the returning empties.

Today, it is customary for paper mills to strap sheet paper on skids. The quantity of paper on a single platform would weigh as much as three to five cases of flat paper.

Skid platforms used for such shipments are made rugged and without frills. They must be sturdy to stand up under the rough handling of a freight shipment as short as a hundred miles.

The handling of case lots of paper

by hand, as was common practice before the advent of skid platforms and pallets, required plenty of brawn. Cases weighed from 400 to 700 pounds. and they were difficult to move and to store. Now a skid load of paper can be moved by one or two men with a lift truck.

The task of removing paper from a skid is much simpler than removing it from a case. Also paper on a skid will keep well in storage.

Paper prices today would be considerably above their present levels if the paper industry had been reluctant to cut handling time and the expense of distribution. The use of the lift truck, both hand operated and power-operated, has played a very definite part in this cost reduction program.

Steam Flow Nomograph

D. S. DAVIS
Wyandotte Chemicals Corp.

▶▶▶ THE RATE OF flow of dry, saturated steam through rounded orifices, nozzles, and short tubes can be calculated by Napier's formula.

$$w = \frac{3}{14}\pi P d^2$$

where w = rate of flow, pounds per minute

P = the initial absolute pressure, pounds per square inch

and d = the diameter of the orifices, nozzle, or tube, in inches when the final absolute pressure just beyond the constriction is less than 58 per cent of the initial absolute pressure.

For steam containing m per cent of moisture, the rate of flow, W, in pounds per minute, is given by

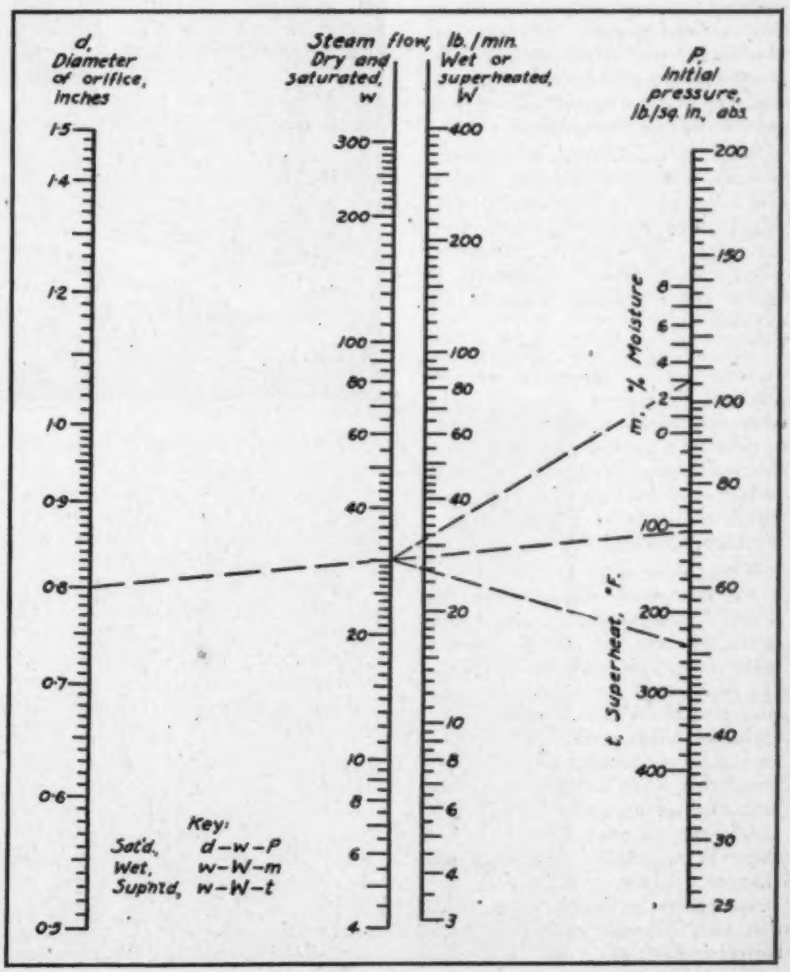
$$W = \frac{w}{1 - 0.012\,m} \quad (3)$$

and when the steam is superheated through t deg. Fahr.

$$W = \frac{w}{1 + 0.00065\,t} \quad (1)$$

The accompanying alignment chart, constructed by methods described previously (*2*) and based on these three equations, enables rapid and accurate computation of the rates of flow of saturated, wet, and superheated steam. The use of the chart is illustrated as follows: At what rate will dry, saturated steam discharge to the atmosphere through a rounded orifice 0.8 inch in diameter when the initial absolute pressure is 70 pounds per square inch? The nomograph is applicable since the downstream pressure is less than 58 per cent of the pressure before the orifice. Following the key, connect 0.8 on the d scale with 70 on the P scale and read the flow rate, on the w scale, as 30.2 pounds per minute.

Under the same conditions, what is the rate of discharge if the steam contains 3 per cent moisture? Connect 30.2 on the w scale with 3 on the m scale and read the desired value as 31.3 pounds per minute on the W scale. What is the rate of flow if the steam is superheated through 240 degrees Fahrenheit? Connect 30.2 on the w scale with 240 on the t scale and read the steam rate on the W scale as 26.0 pounds per minute. The chart can also be used to determine the diameter of the orifice when the rate of flow, initial pressure, and condition of the steam are known.



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(*1*) Crane Company, "Flow of Fluids Through Valves, Fittings and Pipe," Technical Paper No. 409, 1942.

(*2*) Davis, D. S., *Empirical Equations and Nomography*, Chap. V, New York, McGraw-Hill Book Co., 1943.

(*3*) Emswiler, J. E. *Thermodynamics*, 4th ed., New York, McGraw-Hill Book Co., 1937.

The Trend for Alloy-Lined Equipment in the Paper Industry

H. A. SCHMITZ, JR.
A. O. Smith Corporation

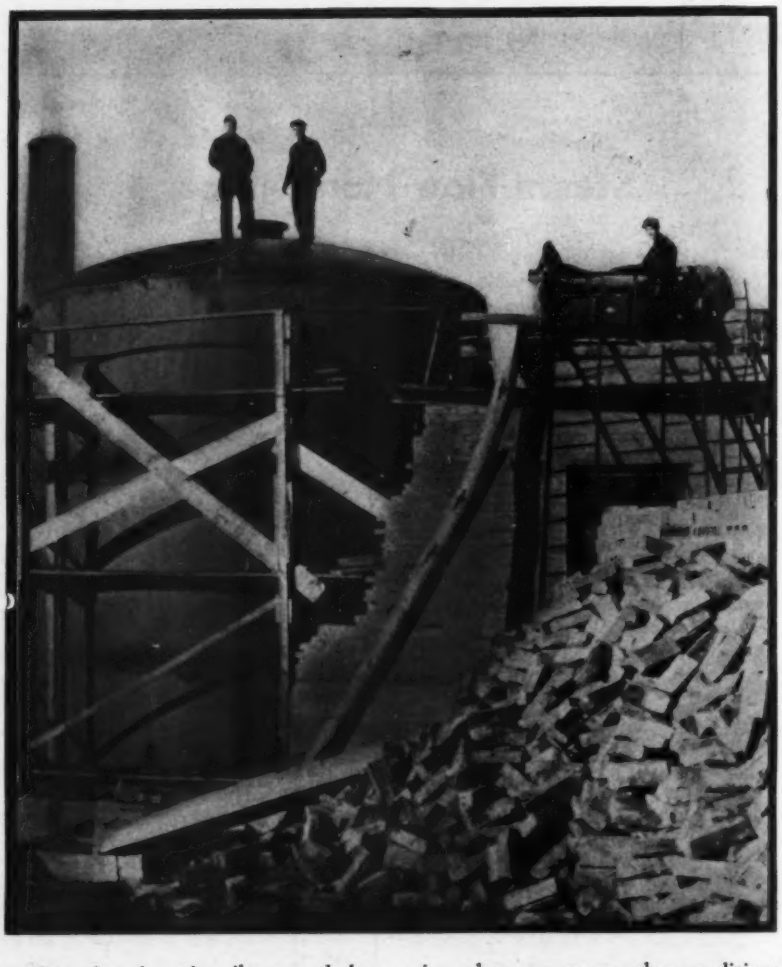


Figure 1

▶▶▶ THE MANY SERIOUS and complex corrosion problems which confront sulphite pulp mills during their manufacturing processes are troublesome not only from a maintenance standpoint, but also from the resulting shutdowns and loss of production during replacement.

With the development of corrosion resistant alloys, it became evident that a practical and economical solution to their corrosion problems was imminent, and that the costly repairs and periodic replacements of linings and equipment would be eliminated.

The use of a solid alloy in the manufacture of equipment was not practical because of the prohibitive costs. It, therefore, became necessary to develop a method of bonding thin sheets of expensive alloy to low-priced carbon steel backing plates so as to reduce the price to a point where it would be economically practical.

When alloys were first introduced, it was erroneously presumed that the so-called stainless steels could be used indiscriminately for any and all corrosion conditions, and that a panacea had been found for all corrosion ills. However, as the knowledge of the behavior of alloys under varying service conditions became known, it was found that while an alloy would give successful service under one operating condition, entirely different results might be expected if these conditions changed slightly, even though they were apparently similar. This meant that each corrosion problem must be treated individually.

Corrosion is primarily caused by the presence of a reducing agent, such as sulphuric acid, or an oxidizing agent, such as nitric acid, or a combination of both. Hastalloy type alloys are generally used for reducing conditions, whereas the chrome bearing steels are usually successful for oxidizing conditions. Where both conditions exist, an inhibitor or a neutralizer should be introduced into the process to counteract or neutralize these conditions.

The corrosion resistant properties of metals are the result of the formation of an oxide film on their surfaces. This is known as passivation. This passivation may be removed during the operating cycle due to erosion, but it is again formed as soon as the surface is exposed to air.

While passivation retards corrosion, there are many other conditions which effect the corrosion resistant properties of alloys. One of the most serious is stress. This can be caused by temperature, pressure, or can be set up during the manufacturing processes. Stresses set up in alloy-lined equipment may be due to the difference in the coefficient of expansion between alloy and carbon steel. It has been found that alloys which give good service when only moderately stressed will fail completely when stressed to a greater degree.

It is vitally important that the behavior of alloys under specific operating conditions be predetermined. This can be done by subjecting alloy samples to operating conditions at the customer's plant, and determining their behavior. These testing programs must be conscientiously carried out,

and the results carefully analyzed to insure the proper selection of an alloy for a specific operating condition.

Our company has taken a part in a great many such programs, and the resulting successful performance in process equipment has meant a longer life and the elimination of costly repairs and replacements. It is important that these tests be conducted with the fullest co-operation between the ultimate user and the manufacturer, and that the manufacturer have the metallurgical facilities to properly interpret the information gathered so that the resulting equipment will give successful performance.

Appreciation of the problems is of greatest importance, as any change in the process or in raw materials can alter the rate and the type of corrosion. In order to be sure of a successful testing program, a materials engineer should be assigned to the job to see that the testing program is properly carried out, and that the proper information is assembled and passed on to the manufacturer. If consulting engineers are employed they should be given the fullest co-operation and no change in the process or in materials should be made without first consulting them.

While the corrosion conditions are unusually severe in the sulphite process, they are also present to a slightly lesser degree in the sulphate mills. Alloys are particularly advantageous in sulphate mills where contamination is a problem.

The following examples of alloy-lined equipment which will give an ideal service illustrate that if an intelligent testing program is carried out, the performance of an alloy can be predetermined; and, as a result, failure of process equipment under operating conditions can be avoided.

Figure 1 is an alloy-lined acid storage tank, 20 ft. in diameter and 32 ft. high. The chrome nickel alloy lining in this vessel was selected after a thorough testing program had been conducted, and as a result the vessel has been operating successfully for over five years.

Depending upon the locality, the cost of alloy-lined acid storage tanks compares favorably with the cost of wooden tanks. While the initial cost is somewhat higher, this is offset by longer life, the elimination of maintenance, losses due to leaks, and periodic replacements. As the tanks can be operated under pressure, additional economy can be expected from saving of heat as well as more uniform process liquors.

Figure 2 shows two alloy-lined rotating digesters for sulphite services. Again the selection of the chrome nickel moley alloy was the result of a conscientiously conducted testing program. These vessels have been in operation for approximately six years and a recent inspection of the interior showed the lining to be unaffected by the severe corrosion conditions. These vessels not only handled sulphite liquor, but are also used for sulphate and soda cooks.

While the initial cost of alloy-lined digesters may run as high as 30 to 40 per cent more than ceramic lined, this cost is offset by the many advantages offered by alloy protection and increased life and capacity. A 15 ft. diameter by 50 ft. long alloy-lined digester will provide more than 25 per cent additional capacity than a digester of the same size lined with 7-in. brick. This increased capacity plus the savings in maintenance, repairs, periodic replacement, and the elimination of contamination will show a great economy over a comparative short period of time.

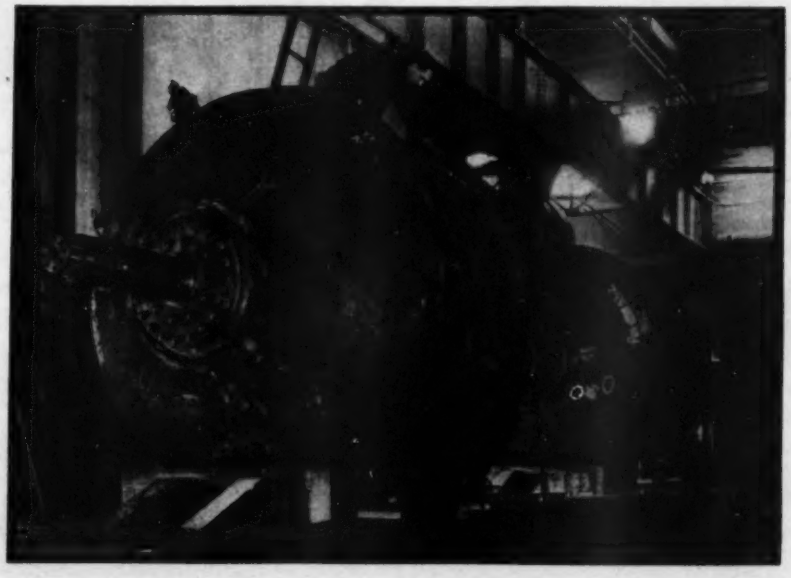
Very often the question of field applied lined equipment is brought up. Results so far indicate that considerable trouble can be expected because of the impracticability of bonding alloy lining to the carbon steel on close enough center. The stresses, due to thermal shock, often cause failures which result in excessive repairing and expensive shutdown periods.

When steel plates are properly lined at the manufacturer's plant, field erected vessels are practical except when subsequent heat treatment is required. In recent years, many such vessels have been field erected for the oil industry and are performing successfully. The knockdown parts for field erected vessels are lined and formed at the manufacturer's plant, and where possible, sub-assemblies are made, and the parts are shipped to the site ready for assembling and welding.

As a result of the advantages, alloy-lined equipment has a definite place in the paper industry; and it is reasonable to expect that such equipment holds considerable promise for successful and economical application in this field.

While contemplated replacements and expansion programs in the paper industry have been held up for several years, the release of alloys for general use gives this industry the opportunity to take advantage of their availability and to receive the benefits offered by their use. It is generally believed that proper use of alloy offers the paper mills a long, looked-for solution to their corrosion problems.

Figure 2



Paper SKETCHES . . . . . .

IN ANCIENT ROME, ROLLS OF PAPYRUS AND QUIRES OF PARCHMENT WERE SOLD AT A WAREHOUSE, CALLED THE HORREA CHARTARIA, LOCATED ON THE ESQUILINE.
PAPER MADE BY JOHN TATE, ENGLAND'S FIRST PAPERMAKER, WAS USED IN THE PRINTING OF A BOOK ISSUED IN 1498 BY WYNKEN DE WORDE.
EACH DAY
110 CARLOADS OF WOOD ARE TURNED INTO 25,000,000 PAPER BAGS AT THE SAVANNAH, GA., PLANT OF UNION BAG AND PAPER CORPORATION. IT TAKES 32 FREIGHT CARS TO SHIP THE BAGS AWAY.
4 GENERATIONS OF THE RITTENHOUSE FAMILY, BEGINNING WITH WILLIAM RITTENHOUSE IN 1690, MADE PAPER CONTINUOUSLY FOR 121 YEARS NEAR GERMANTOWN, PA.

Directly Measures MOISTURE CONTENT *of Moving Sheet*

IMAGINE the economies and better quality possible by having an immediate indication and record of paper moisture content—as it goes from the drying cylinders to the calender stack.

The Brown Moist-O-Graph operating on the principle of measuring the electrical resistance through the moving sheet—provides immediate readings and automatic signals to operators when moisture content goes below or above set tolerances. The Moist-O-Graph tells what is happening at the moment. There is no waiting for laboratory reports. The instrument responds instantly to moisture changes acting as a positive guide to paper makers.

The Moist-O-Graph permits maximum amount of water to be held without discoloring or spoilage. Eliminates overdrying—increases production—lowers steam costs. Insures uniform quality, weight and caliper of stock.

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BROWN MOIST-O-GRAPH

STAMP RECONSTRUCTION?

While on a business trip in South America, an ultramarine and dyestuff representative of the Calco Chemical Division, American Cyanamid Company, Bound Brook, New Jersey, acquired one of the rarest Brazilian stamps, the black 600 unused of the Inclinado Empire Series, issued in 1844-1846. This stamp had been purchased from a Chilean dealer and was from the Alessandri Collection in Santiago, Chile.

In showing this stamp to a New York dealer, it was questioned whether the stamp had been reconstructed in one corner because when put into benzene this corner appeared different from the others. Careful examination under the microscope by various methods of illumination including ultraviolet light, could not show this corner to be different.

Paper fibers ran directly from the center of the stamp into the questioned corner, making a repair quite improbable. However, the most convincing observation to prove the authenticity of the stamp oddly enough came back to ultramarine blue pigment. The microscope at high magnification revealed a clear and rather large size transparent blue pigment throughout the paper, both in the body of the stamp and in the questioned corner. It is probable that the paper on which the stamp was printed was of French origin and that the Ultramarine had been added to "whiten" the paper. The corner which had failed to "wet out" in the benzene was probably caused by a hard spot produced by the reaction of some chemical dropped upon the paper or due to some mechanical difference in the construction of the original paper. Thus, the ultramarine pigment put in by the artisan years ago made it possible to establish the identity of very small portions of his paper today.

◆

MAGNESIUM OPERATIONS CONSOLIDATED BY DOW

A consolidation of magnesium operations of The Dow Chemical Company, Midland, Michigan, under a separate executive board and general manager, and the immediate resumption of magnesium production at the company's sea water plant at Freeport, Texas, were announced simultaneously on May 17 by Dr. Willard H. Dow, president and general manager of the Dow company, who will act as chairman of the new executive board.

Dr. Dow states that the new arrangement throws the full weight of Dow's magnesium technical resources behind the sales department so that the greatest possible technical assistance may be given to users and fabricators of magnesium throughout the country.

Production at the Texas plant, which has been closed since the end of the war, will be resumed as soon as possible, and is expected to reach full capacity by summer. Dr. J. D. Hanawalt, former director of metallurgical research, will be in charge.

◆

HARRIS-SEYBOLD EXPANDS SALES AND SERVICE IN EAST

An expanded program of sales and service has brought about a reorganization and expansion in the eastern district for Harris-Seybold Company, Cleveland.

J. W. Valiant, vice president and eastern district manager, has appointed three branch managers: S. E. Arnett, New York Metropolitan Area; J. C. Doty, New England Area; and R. H. Randall, Philadelphia Area. W. I. Claire has been appointed eastern district office manager.

The company states this expanded program is designed to better serve the graphic arts and allied industries in the East.

◆

STANDARD OIL (IND.) HAS ESTABLISHED FELLOWSHIPS IN 17 EDUC. INSTITUTIONS

The establishment of 22 graduate fellowships at 17 educational institutions by Standard Oil Company (Indiana) was announced recently by Dr. Robert E. Wilson, chairman of the board, who said the purpose of the program is "to provide 'seed corn' for future research."

Fellowships in chemistry have been established at Northwestern, Illinois, Chicago, Wayne, Ohio State, Wisconsin, Iowa State, and Johns Hopkins; in chemical engineering at Massachusetts Institute of Technology, Minnesota, Illinois, Cornell, Carnegie Tech, and Princeton; in engineering at Michigan, Minnesota, Iowa, Illinois, Purdue, and Illinois Institute of Technology; in civil engineering at Purdue; and in marketing and management at Northwestern.

The fellowships will be awarded to students working for master's or doctor's degrees. They will vary somewhat in amount, depending on the tuition and other fees at the various

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institutions, but the average for each fellowship will be approximately a year. The work done will be basic research, and the results will be published in accordance with the usual academic practice. Holders of fellowships will be under no obligation to Standard Oil as regards subsequent employment. The sponsoring company will also receive no rights to any patents resulting from the work.

Indiana Standard's crude-oil-producing subsidiary, the Stanolind Oil & Gas Company, will also sponsor fellowships in geology at Yale, in chemistry at Pennsylvania State, in geophysics at California Institute of Technology, in electronics at Harvard, in accounting at Pennsylvania, and in petroleum engineering at Oklahoma, Michigan, and Texas.

◆

NEW LAWSON PAPER CUTTER UNVEILED IN NEW YORK CITY

The new Lawson paper cutter—the Lawson "38"—was unveiled to an audience of over 100 representatives of the printing and binding trades at an afternoon reception April 15 in the showroom of the manufacturer, E. P. Lawson Company, 426 West 33rd Street, New York City.

David W. Schulkind, president of the Lawson company, explained the development of the new cutter and recited various incidents and experiences during the past that inspired the many features of the new Lawson "38." William Hourigan, treasurer, then introduced Harvey Glover of the Sweeney Lithograph Company, Belleville, New Jersey, and well known in the graphic arts field, who was chosen to christen the new cutter.

Mr. Glover, past president of the New York Club of Printing House Craftsmen, the Litho Club, and the International Association of Printing House Craftsmen, "launched" the new cutter in the customary manner with a bottle of champagne, after it was unveiled by Lawson Williams and Herman Sinnegan, vice presidents of the Lawson company. Said Mr. Glover, "It is a privilege and an honor to christen you the Lawson cutter. May you cut your name around this world and be a pride of achievement for your creator, E. P. Lawson Company."

Honor of making the first cut with the new machine went to its designer, Fred Seybold, chief engineer of the Lawson company. Frank Cady, chief maintenance engineer, demonstrated the machine for those present. Much interest was shown in the general design and features of the new cutter which include many revolutionary production and safety factors.

The new Lawson cutter, Mr. Schulkind announced, will be on continuous display in the Lawson showrooms for inspection by the trade during the next few months.

◆

CORNING GLASS WORKS TO ACQUIRE PARKERSBURG PLANT

A tentative agreement has been reached between Corning Glass Works and the War Assets Administration for the acquistion by Corning of land and buildings owned by the Government at Parkersburg, West Virginia.

The plant was built in 1942 by Corning for the Defense Plant Corporation, and it has been operated since that time by Corning. Pending final purchase details, production has been limited to finishing gauge glasses, colored optical filters and certain laboratory apparatus. The company's reconversion program will be timed to fit existing conditions. The multiple advantages offered by this modern plant will allow great flexibility in future commercial production.

◆

MARSHALL DILL NOW PART OF WITCO CHEMICAL CO.

The consolidation of the Marshall Dill organization, San Francisco, California, with the Pacific Coast activities of the Witco Chemical Company, New York City, has been announced.

Marshall Dill

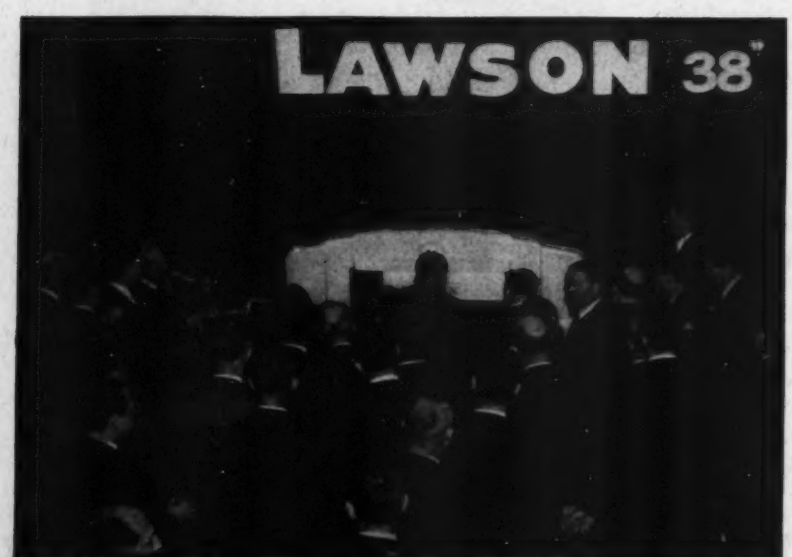
Marshall Dill organization was established in 1900 as a sales organization covering the western part of the United States for domestic and foreign manufacturers. Since then Marshall Dill has developed extensive export and import business with offices and warehouses in San Francisco and Los Angeles, and additional outlets in Portland, Spokane, Seattle, and Denver.

The acquisition of the Marshall Dill organization marks expansion on the west coast of the distribution phase of Witco's chemical business in order to keep abreast of the company's manufacturing activities.

◆

EXPANSION UNDER WAY AT TOWMOTOR CORPORATION

Postwar expansion announced recently by Towmotor Corporation, Cleveland, has been reported as amounting to $500,000. The company has purchased the government-owned plant it operated. In addition, another building will be constructed. When the expansion is completed, the company states it will have about 100,-



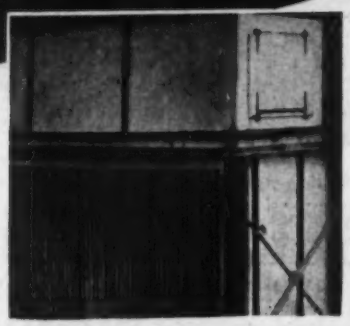
A large group witnessed the unveiling of the new Lawson paper cutter

Stop Wasting Heat You Need

New Method Recovers Millions of B. T. U.'s From Heat Being Wasted

This modern Ross system, combining use of the Ross Briner Economizer with the Ross Scrubber, saves thousands of pounds of steam per ton of production by extracting heat from exhaust vapors. By this method either or both fresh water or white water is heated as well as exhaust air for maximum heat recovery. White water is heated first, then air by the economizer and finally the fresh water. This remarkable new heat recovery method is effecting saving of $1.00 and more per ton of paper produced. Installation of this system is practical even in the South.

Where less than maximum heat recovery is required it is possible to install any one or a combination of Ross Briner Economizer and fresh or white water heating equipment. Consult our engineering staff on your particular requirements.



View of Ross Briner Economizer

Cutaway view of Ross Scrubber

ROSS SYSTEMS

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DESIGNERS AND BUILDERS OF AIR PROCESSING SYSTEMS

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CARRIER—ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND

000 square feet of floor space. It will continue its wartime employment of about 500 persons and expects to produce $10,000,000 worth of equipment annually.

◆

▶▶▶ FOUR-STAR gold emblems were awarded to more than 100 employees of the Calco Chemical Division of American Cyanamid Company in April for a quarter-century or more of service. Gold emblems for all employees having served ten years or more also will be awarded.

◆

HEWITT RUBBER CHANGES NAME TO INCLUDE IDENTITY OF ROBINS CONVEYORS, INC.

The name of Hewitt Rubber Corporation has been changed to Hewitt-Robins Incorporated, thereby bringing in the identity of its wholly-owned subsidiary, Robins Conveyors Incorporated. This change was approved by stockholders at a meeting held in Buffalo April 30, at which time all officers were re-elected. Harold H. Von Thaden, first vice president of Robins Conveyors, was elected a director of Hewitt-Robins Incorporated.

The manufacture of foam rubber, molded rubber goods, conveyor belts, transmission belts, and industrial hose in the company's Buffalo plants will continue as the Hewitt Rubber Division of the corporation. The engineering and manufacturing of conveyors and other materials handling systems at Passaic, New Jersey, will be known as the Robins Conveyors Division.

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▶▶▶ A NEW METHOD for making bearings metallurgically and geometrically more perfect is being tested by The Timken Roller Bearing Company in a "pilot" plant at Zoarville, Ohio, before it is adopted on a factory-wide basis. The process, a project of Timken's Division of Development and Research, located in Canton, Ohio, has been used in making Timken Roller Bearing parts in the miniature plant for the past year.

◆

▶▶▶ ALL SALES OF FOIL in the United States for Dominion Foils, Ltd., of Canada, will be handled by the specialty division of Bulkley, Dunton & Company, Inc., New York City, which company has been appointed United States sales agents for the Canadian company.

◆

▶▶▶ A WELDED PRODUCTS Division has been established by American Car and Foundry Company, New York City. This division which will concentrate on the design, development, and manufacture of weldments, has facilities and equipment for automatic and hand welding, heavy forming machinery, heat treating and stress relieving units, metallurgical and physical testings, X-ray and magnaflux inspecting equipment.

◆

THREE EXECUTIVES LEAVE PERMUTIT—START NEW CO.

Three executives of The Permutit Company, New York City, resigned on April 15 after about thirty years of association with the firm.

S. B. Applebaum and H. L. Tiger each held offices as vice president and director. Mr. Applebaum had for some time been in charge of technical policy, contract and guarantee approval, mechanical design and developments. Mr. Tiger had been in charge of research and development, and patents. The third to resign was Norman E. Brice, mechanical engineer, who had been in charge of engineering layout and design, and factory construction and maintenance.

The three gentlemen are organizing a new company to be known as Liquid Conditioning Corporation. Present offices are at 423 West 126 Street, New York City. The new company will carry on a general business in the field of water conditioning for industrial, municipal, railroad and household use. Equipment and materials also will be provided for conditioning other liquids, including chemical liquids.

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▶▶▶ TWO PLANTS will be built at Sedalia, Missouri, by the Pittsburgh Corning Corporation, Pittsburgh, for the production of glass block and Foamglas. Estimated cost of the expansion program is $2,000,000.

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▶▶▶ PRESS REPORTS on May 19th announced that Diamond Alkali Company, of Pittsburgh, has purchased a tract of 12 acres in Chicago and will build a $400,000 plant and warehouse. Rust Engineering Company has a contract for the work.

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▶▶▶ THREE MEMBER paper companies of Trees for Tomorrow, Inc., will plant 750,000 trees this spring in Oneida County, Wisconsin, in addition to the 178,200 trees to be distributed in the county under the organization's "2 for 1" plan. The three companies are: Rhinelander Paper Company, Tomahawk Kraft Paper Company, and the Consolidated Water Power & Paper Company.

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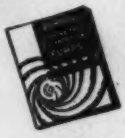
Aurora Deep Well Turbines for all conditions—4" to 24"

The able performance of our pumps, with high efficiency and lasting dependability, fulfills the fundamental purpose of our business. The full range of types and sizes in which AURORA CENTRIFUGAL and APCO TURBINE-TYPE PUMPS are available meets practically every industrial pumping need. Put a PUMP "by Aurora" on that next liquids handling job. You, TOO, will LIKE it.

NSA Aurora Centrifugal Sump Pump

WRITE FOR CONDENSED CATALOG M



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Type AD Hor. Split Case, Two Stage Centrifugal

APCO Horizontal Condensation Return Unit

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APCO Single Stage Turbine-Type

Type GMC Close-Coupled Centrifugal

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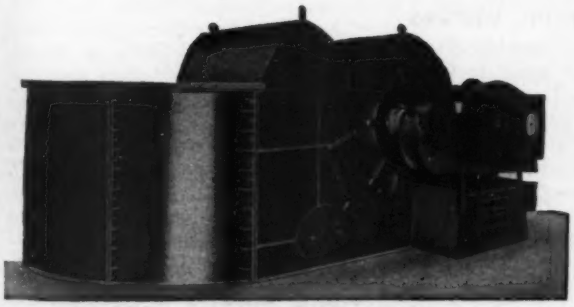

The satisfactory results of the Jones-Bertrams Beater have been evidenced in mill after mill:

UNIFORM FIBRE TREATMENT — Practically 100 per cent circulation is accomplished, thereby producing uniformly refined fibres.

SHORT BEATING CYCLE — Roll and bedplate design results in producing a great amount of work in a very short time.

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LOW H. P. PER TON — Highly efficient utilization of horsepower.

FLOOR SPACE SAVING — Replaces three, four, or more regular Hollanders.

In the event that you have not already investigated all the advantages of the Jones-Bertrams Beater, we will be pleased to give full particulars.

Jones

E. D. JONES & SONS COMPANY, Pittsfield, Mass.
Builders of Quality Machinery for Paper Mills.

LAST MEETING OF SEASON WESTERN N. Y. GROUP OF EMPIRE STATE SEC. TAPPI

The May meeting of the Western New York Group of the Empire State Section of the Technical Association of the Pulp and Paper Industry was held the evening of May 8 at the Prospect House, Niagara Falls, New York.

A short business session preceded the program, at which time the following officers were elected for the coming year:

General Chairman—Dr. A. H. Nadelman, International Paper Company, Niagara Falls, New York.

Committee Chairmen — Speakers Committee: J. W. Youngchild, International Paper Company, Tonawanda, New York. Dinner Committee: G. H. Rand, Jr., International Paper Company, Niagara Falls, New York. Attendance Committee: R. D. Rusch, International Paper Company, Tonawanda, New York. Publicity Committee: P. R. Rolleston, Moore Business Forms, Niagara Falls, New York.

H. A. Spencer, Watertown, New York, chairman of the Empire State Section of TAPPI, was a guest and addressed the group briefly.

A colorful sound film entitled "The Portrait of an Industry," was presented by the Heller & Merz Department, Calco Chemical Division, American Cyanamid and Chemical Company. This film gave a pictorial story of the discovery of the first synthetic dyestuff and showed the progress and growth of the industry up to the present time. It also illustrated how the different units of the American Cyanamid Company contribute their part to the manufacture of colors in the Heller & Merz Department and gave a better understanding of the processes involved in the manufacture of these colors.

F. O. Sundstrom, Heller & Merz Department, Calco Chemical Division, American Cyanamid Company, spoke on the "Influence of Rosin Size on the Retention of Acid Colors." He has been associated with the paper industry doing technical service work for Heller & Merz for approximately 22 years. At the present time, Mr. Sundstrom is assistant manager of the Application Laboratory, in charge of the paper section of the Laboratories. In his talk, Mr. Sundstrom told of one phase of the experimental work which had been done by the laboratory in investigating the effect of rosin size alone on the retention of acid colors. This work was on a laboratory scale only, but it gives some indication of the performance of the above colors under these conditions. It can serve as a guide for determining which of these colors require better techniques in their economical use in industry. Mr. Sundstrom's talk was followed by a spirited discussion period which was very enlightening.

This was the Group's last technical meeting of this season. Regular meetings will be held every second Wednesday of the month, beginning next September.

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TAPPI COMMITTEE HOLDS SECOND ANNUAL MEETING

The second annual meeting of the Fibrous Agricultural Residues Committee of the Technical Association of the Pulp and Paper Industry was held April 26 at the Northern Regional Research Laboratory in Peoria, Illinois. This committee was organized in 1944 to improve the present processes for straw pulp and corrugating paper production, and to develop other agricultural residues for use in quality pulps as well as in strawboard.

Dr. S. I. Aronovsky, in charge of the Pulp and Paper Section of the Laboratory and chairman of the committee, was in charge of the meeting.

The question of combines was brought up and it was shown that from the percentage of combined straw procured in various parts of the country that this machine is rapidly displacing the regular harvester. It was agreed that users of straw will have to develop economical methods of gathering and baling the combined straw. The committee's program for dealing with the straw and strawboard problems met with the approval of the committee. The committee recommended that the straw be harvested and baled at the time of the harvest so that it will be dry and in good condition.

The meeting was attended by approximately 50 members of strawboard industries. Dr. E. C. Lathrop, acting director of the Laboratory, was present at the meeting, as was R. G. Macdonald, national secretary of TAPPI.

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▶▶▶ CONCURRENT WITH the Fourth National Chemical Exposition to be held in Chicago September 9 to 13, the semiannual meeting of the American Chemical Society will be held at the Chicago Coliseum from September 10 to 14.

◆

DISCUSSION ON STARCH CRISIS AT CHICAGO PRO PAPER GROUP MEETING

A very interesting and well attended meeting of the Chicago Professional Paper Group was held during the evening of April 15 at the regular meeting place of the organization—29 South La Salle Street, Chicago, Illinois. The program was given over to a panel discussion on "Weathering the Starch Crisis." The panel members were: J. V. Bauer, Stein-Hall Company; E. S. Gantt, Corn Products Refining Company; L. J. Hayhurst, Hayhurst Research Laboratory; J. E. Killinger, Penick & Ford; Fred Sanders, National Starch Products; Don Thom, F. G. Findley Company; and E. W. Morton, American Bitumuls Company.

Because of the critical situation confronting industrial users of starch-based adhesives and other products, these men were barraged with questions. The answers revealed the gloominess of the situation and yet there was a spirit of hopefulness in the willingness of the panel as well as members of the audience to pass on information of real helpfulness.

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PUBLIC PRINTER ADDRESSES NATIONAL PAPER TRADE ASS'N

Instead of holding its convention simultaneously with that of American Paper and Pulp Association in February, the National Paper Trade Association met at the Waldorf-Astoria from April 1 to 3. The public printer, A. E. Giegengack, told the convention of the needs of the Government Printing Office, and complained that the Government might be forced into building and operating its own mill unless industry took care of national needs.

The general tone of the convention was optimistic, even though it was

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Today, as essential materials are released for general use—and demand for them is heaviest—Whittaker is among the first to offer them for sale. The first talcs to leave India, Italy and France for commercial use after the war's close, for instance, were Whittaker imports. If a product is available at all, it is Whittaker's unswerving endeavor to have it first... and in the widest variety of desirable grades.

Whittaker has ten well-informed agents, fourteen plants and well stocked warehouses, strategically located to serve all the United States and southeastern Canada.

Call on Whittaker for prompt attention to your wants. Order commercial quantities with full assurance of getting materials of controlled quality and uniformity—or write, at any time, for technical data, laboratory samples, or for advice.

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In Pensacola, Florida you will find many modern Layne Well Water Systems. Check the city water works, big paper pulp mills, the Naval Air Station and auxiliary fields, Army Training Camp, the largest brewery, the ice plant, a wood chemical processing plant and other industries. All have highly efficient Layne Well Water Systems. The same record of Layne installations applies to hundreds of other cities. The reason is more than obvious. Layne Well Water Systems are better designed, more efficient, sturdier built and of finer quality materials.

Layne Well Water Systems serve hundreds of cities, factories, railroads, mines and irrigation projects in all parts of the world—and consistently show the lowest upkeep cost of any well water producing equipment made.

The services of Layne Engineers, who are widely experienced in all phases of water production are available without cost or obligation. For further details, literature, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

HIGHEST EFFICIENCY

Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

recognized that there is now and will be a shortage of supplies for some time. The merchants, however, were told that new construction and full time operation would go far toward meeting consumer needs.

Senator Brewster, of Maine, criticized Washington methods of trying to meet changing business conditions, citing as an example of contradictory policies the authorization by one agency of the construction of a huge volume of new homes, while another agency authorized the export of sufficient lumber to meet much of the need for materials for the construction program otherwise impossible of attainment.

Officers elected were:

President—G. E. Carpenter, Carpenter Paper Co., Omaha, Neb.

Vice President, Fine Paper Division—A. W. Towne, Blake, Moffit & Towne, San Francisco

Vice President, Wrapping Paper Division—Ralph Luff, D. F. Ward Co., Philadelphia

Treasurer—J. O. Buckley, Bulkley, Dunton & Co., New York

Executive Secretary—A. H. Chamberlain, New York

In another move to decentralize convention operations and attain a greater interest in their operations, a packaging exposition was held in Atlantic City, New Jersey, immediately following the National Paper Trade Association meeting, and the exhibits included elaborate showings by a large number of paper and paperboard manufacturers, as well as paperboard container companies.

The Oldest Division of the Superintendents Association Holds Annual Ladies Night

Once each year, the Michigan Division of the American Pulp and Paper Mill Superintendents Association puts aside such weighty problems as new and better processes for making paper, the latest developments in equipment and materials, the cares and responsibilities felt in these strenuous times by each member. On this one night the superintendents of that Division invite the ladies and business is given over to an evening of fun and frolic.

The Annual Ladies Night Party on Saturday evening, May 11, was a particularly special occasion—it was the first of these events since the end of the war. Good fellowship and merriment reigned throughout the evening, with nearly 200 members and guests present.

The Allied Industrial Affiliates—that aggressive organization which marches along with the Association—sponsored the cocktail party which preceded the dinner. Arrangements for this very popular prelude to the dinner were ably handled by A. E. Woollam and Carl Holberle of the Affiliates.

Following the cocktail party, the

View of the speakers table at the Annual Ladies Night given in the Park American Hotel, Kalamazoo, Michigan, by the Michigan Division of the Superintendents Association

Seated at the speakers table at the Annual Ladies Night Dinner of the Michigan Division of the Superintendents Association were: Standing and seated (l. to r.)—Pete Talbot (Williams-Gray Co.), who acted as toastmaster, and Mrs. Talbot; Ralph Atkins (Lee Paper Co.), chairman of the Division, and Mrs. Atkins; Herbert B. Johnston (Allied Paper Mills), second vice chairman of the Division, and Mrs. Johnston; Raymond L. Barton (Michigan Paper Co.), national president of the Superintendents Association, and Mrs. Barton; Wm. Astle (Michigan Paper Co.), secretary-treasurer of the Division, and Mrs. Astle; Walter Wolfe (Mac Sim Bar Paper Co.), first vice chairman of the Division, and Mrs. Wolfe. Standing beside Mr. Wolfe is A. E. Woollam, of the Industrial Affiliates

guests filed into the big dining room to the incomparable music of Charles Fischer's orchestra. These fine, internationally-famous musicians played throughout the dinner and later for the dancing.

After dinner, there was a session of breezy, sparkling entertainment—impromptu after-dinner conversation and short talks spiced with humor and gay repartee. Pete Talbot, of Williams-Gray Company, was master of ceremonies. His keen wit drew scintillating response from those present which brought the gaiety of the evening to a pleasing climax.

Seated at the speakers table with the officers of the Division were Mr. and Mrs. Ray Barton. Mr. Barton (Michigan Paper Company, Plainwell, Michigan) is national president of the Superintendents Association.

Accompanying dinner tickets were cards for door prizes. After the dinner, prizes were presented to Jack Dickson, of R. T. Vanderbilt Company, and Mrs. Ralph Atkins.

General chairman of arrangements for the evening was Herb B. Johnston, of Allied Paper Mills, Kalamazoo. Mr. Johnston is second vice chairman of the Division. The other divisional officers who participated in making the evening a success were: Ralph Atkins, Lee Paper Company, Vicksburg, Michigan, chairman; Walter F. Wolfe, Mac Sim Bar Paper Company, Otsego, Michigan, first vice chairman, and William H. Astle, Michigan Paper Company, secretary-treasurer.

The national American Pulp and Paper Mill Superintendents Association was organized twenty-seven years ago, and the Michigan Division was the first divisional body to be organized.

Since 'way back when the Michigan Division of the Superintendents Association started the practice of having a Ladies Night Dinner once each year, Charles L. Fischer and his orchestra have played for the dinner and the dancing which followed. At the right is Charles Fischer, who next year will celebrate his golden anniversary as an orchestra leader. With his violin he directed and led the once famous Fischer Globe Trotters on cruises 'round the world. In the center is Burton Fischer, pianist; at the left, Ed Smuggs, 'cellist

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BOLTON CONTEST CLOSING DATE EXTENDED TO JULY 1

An announcement from the New York office of The American Pulp and Paper Mill Superintendents Association, Inc., states that at the request of the Association the Bolton Company has consented to allow the second Bolton Award Contest to run until July 1. The contest originally was scheduled to close May 1. In addition to advancing the closing date, the scope of the contest has been broadened.

The Contest subject this year is "How Can Superintendents and Foremen Help Management." This suggests that contestants may write on ways to—

reduce maintenance costs
make cleaner paper
improve workers' morale
secure co-operation between departments
improve storage or routing

or any other idea for improving the mill where he is employed. The total prizes are $5,000 in U. S. Savings Bonds. Papers must be submitted before July 1, 1946 to George W. Craigie, secretary-treasurer, The American Pulp and Paper Mill Superintendent Association, Inc., 220 East 42nd Street, New York 17, N. Y.

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COMING EVENTS

June 17-20—Annual convention American Pulp and Paper Mill Superintendents Association, Poland Spring House, Poland Spring, Maine.

July 8—Southern Paper and Pulp Association, Asheville, North Carolina.

Sept. 10-14—National Chemical Exposition, The Coliseum, Chicago.

Sept. 13-14—Fall meeting of the Northeastern Division of the American Pulp and Paper Mill Superintendents Association, at Mount Washington Hotel, Bretton Woods, New Hampshire.

Sept. 16-20—First National Instrumentation Conference and Exhibit, Wm. Penn Hotel, Pittsburgh, Pa.

Oct. 7—National Safety Congress, in Chicago. Headquarters and exhibits at Stevens Hotel. Meetings may be held in Stevens, Palmer House, and Congress Hotels.

SAFETY

GREEN CROSS FOR SAFETY CAMPAIGN IS IN PROGRESS

At the request of President Truman organized safety has tightened its belt and has gone into a new war with that great national foe—Accidents.

In announcing the Green Cross Safety Campaign, Ned H. Dearborn, president of the National Safety Council, stated that "during the war, deaths and injuries from accidents on the home front exceeded battle casualties among the American forces. Our losses to enemy action were 261,608 killed, and 651,911 injured. Home front accidents of all types during this period claimed 355,000,000 persons, no less than 1,250,000 of these injuries being of a permanent nature.

"There where 96,000 Americans killed last year in all types of accidents —equivalent to the annihilation of six full infantry divisions.

"At least 10,300,000 persons were injured in all accidents in 1945 alone —a total approximately the peak war strength of the U. S. Armed Forces."

The National Safety Council has thrown all of its resources behind this Green Cross for Safety campaign. All over the country the Green Cross badge will be worn by thousands of Americans who are contributing to this movement. Any campaign must ride to its goal on expense and the National Safety Council is asking Americans to share the cost. The monetary value of such a movement is cheap when compared with the most precious possession ever owned—*human life.*

If there is no local Green Cross for Safety campaign in your community, send your contributions to The Green Cross for Safety, National Safety Council, 20 N. Wacker Drive, Chicago 6, Illinois, and receive your Green Cross badge.

◆

SAFETY SCORES

▶▶▶ PERFECT SCORES are recorded for ten mills at the close of The Paper Industry Safety Contest for the ninth month, March, 1946.

Division I—Pulp and Paper Mills

Group A—None.

Group B

Kimberly-Clark Corp., Niagara, Wis.

The Flintkote Co., Meridian, Miss.

Group C

Price Bros. & Co., Ltd., Jonquiere Mill, Quebec, Can.

Group D

Marathon Corp., Ashland, Wis.

E. I. duPont de Nemours & Co., Inc. (Russell Plant).

Strathmore Paper Co. (Woronoco Mill No. 1), West Springfield, Mass.

Division II—Paper & Board Remanufacturing

Group A—None.

Group B

Fort Wayne Corrugated Paper Co, Chicago.

Bird & Son, Inc. (Roofing Plant), Shreveport, La.

The Flintkote Co. (Hollywood Paper Box Div.), Los Angeles, Cal.

Bay West Paper Co., Green Bay, Wis.

New! a visual aid allowing group participation!

IT'S THE SAFETYGRAPH

What news! A visual aid that's ready for action all the time. No special costly equipment, nothing to do but set up the easel, turn the pages, and give the convincing, fast-moving safety talk printed on the back of each page.

What a subject! Safetygraph No. 1 is devoted entirely to "HOW TO LIFT." Every phase of lifting and handling objects is thoroughly covered.

What an idea! The 18 x 24-inch Safetygraph has 16 instructive pages of attention-getting photographs and cartoons emphasizing lifting do's and don't.

What a feature! Permits group participation in on-the-spot discussions. Workers can ask questions, offer suggestions, and tell their accident experiences without fear of disrupting the meeting. Next time you hold a safety meeting, make it a Safetygraph Meeting!

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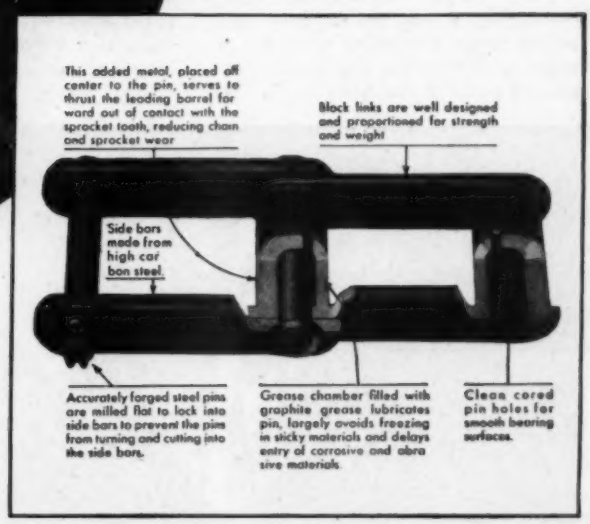
NATIONAL SAFETY COUNCIL, Inc.

20 North Wacker Drive — Chicago 6, Illinois

THIS CHAIN STOPS TEETH FROM *GRINDING!*

① YOU GET LONGER LIFE . . . more efficient service on transfer and pulpwood conveyors . . . with Rex Durobar chain. For only Durobar has the famous eccentric barrel construction that eliminates grinding between leading barrels of the block link and sprocket teeth.

② DUROBAR is noted for its durability. On pulp log conveyors, such as this, it takes a terrific pounding, but it's more than equal to the task. Block links are made in malleable iron and connecting side bars are blanked from high carbon steel. Where even greater strength and resistance to abrasion are needed, Durobar block links are furnished in Z-Metal, the ferrous metal that is 25% stronger than standard malleable iron.


This added metal, placed off center to the pin, serves to thrust the leading barrel forward out of contact with the sprocket tooth, reducing chain and sprocket wear
Block links are well designed and proportioned for strength and weight
Side bars made from high carbon steel
Accurately forged steel pins are milled flat to lock into side bars to prevent the pins from turning and cutting into the side bars.
Grease chamber filled with graphite grease lubricates pin, largely avoids freezing in sticky materials and delays entry of corrosive and abrasive materials
Clean cored pin holes for smooth bearing surfaces.

③ THIS CROSS SECTION shows where Durobar gets that extra strength. Notice how the barrels are reinforced on the block links. This eccentric construction keeps the leading barrel of the block link out of contact with the sprocket tooth and eliminates grinding action between them as the chain flexes over the sprocket. This exclusive construction assures longer life for both chain and sprocket.

REX CHAIN BELTS *manufactured in every available type for the positive transmission of power, timing of operations and conveying of materials*

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NAMES in the News

Douglas Nelson Smith Clark Spaulding WHITE CLEVELAND Arthur Wolf Morris Simpson Kraft Bryan Temple

PERSONALS

ERNST MAHLER IS GIVEN CITATION BY WAR DEPT.

A signal honor was conferred upon Ernst Mahler, executive vice president of Kimberly-Clark Corporation, Neenah, Wisconsin, when he was presented with the War Department's Certificate of Appreciation. The presentation was made by Brigadier General D. N. Hauseman, director of the Readjustment Division.

During the war, Mr. Mahler served with the Readjustment Division Headquarters, ASF. He also was a member of the purchase policy division, ASF, having been appointed by General Somervell in 1942. In this capacity he helped to formulate purchase policies, review legislation and implement the utilization of small war plants, as well as to assist in making contract termination regulations.

From January until April, 1945, Mr. Mahler was in the European theater as expert consultant in charge of paper production for the general purchasing agent of the Army in the theater. With headquarters in Paris, he organized production in Belgium, Holland, France and Germany, setting up mills in Belgium with raw materials obtained from Germany. Shortly after V-E Day, in May, 1945, Mr. Mahler was appointed by the President as industrial adviser to the United States Commission on Reparations in Moscow. He attended the Potsdam conference and was in Berlin for a time. He returned to this country in August, 1945.

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▶▶▶ Chief oiler of paper machines at the plant of Gilbert Paper Company, Menasha, Wisconsin, *George Rank* retired recently after 52 years of continuous service with the company.

Ernst Mahler, executive vice president of Kimberly-Clark Corporation, Neenah, Wisconsin, is shown (at right) as he received the War Department's certificate of appreciation from Brigadier General D. N. Hauseman, director of the readjustment division

DR. PIGMAN APPOINTED TO ORGANIC CHEMISTRY GROUP AT INSTITUTE

The Institute of Paper Chemistry, Appleton, Wisconsin, announces the appointment of Dr. William Ward Pigman to the Organic Chemistry group.

Born in Chicago, Dr. Pigman received his Master's degree in 1933 from George Washington University, Washington, D. C., and in 1936 he received his Doctor's degree from the University of Maryland. He also studied at the University of Leipzig in Germany in 1938-1939 under the auspices of the Lalor Foundation.

Dr. William Ward Pigman

From 1930-1937, Dr. Pigman was a research assistant and from 1940-1944 a research chemist at the National Bureau of Standards, Washington, D. C., where he was engaged in a study of carbohydrates and their behavior with enzymes. For the past two years he was a group leader in the Research department of the Corn Products Refining Company, Argo, Illinois.

Dr. Pigman is co-editor with Dr. M. L. Wolfrom, Ohio State University, of the series "*Advances in Carbohydrate Chemistry*, Volume II of which will appear this year.

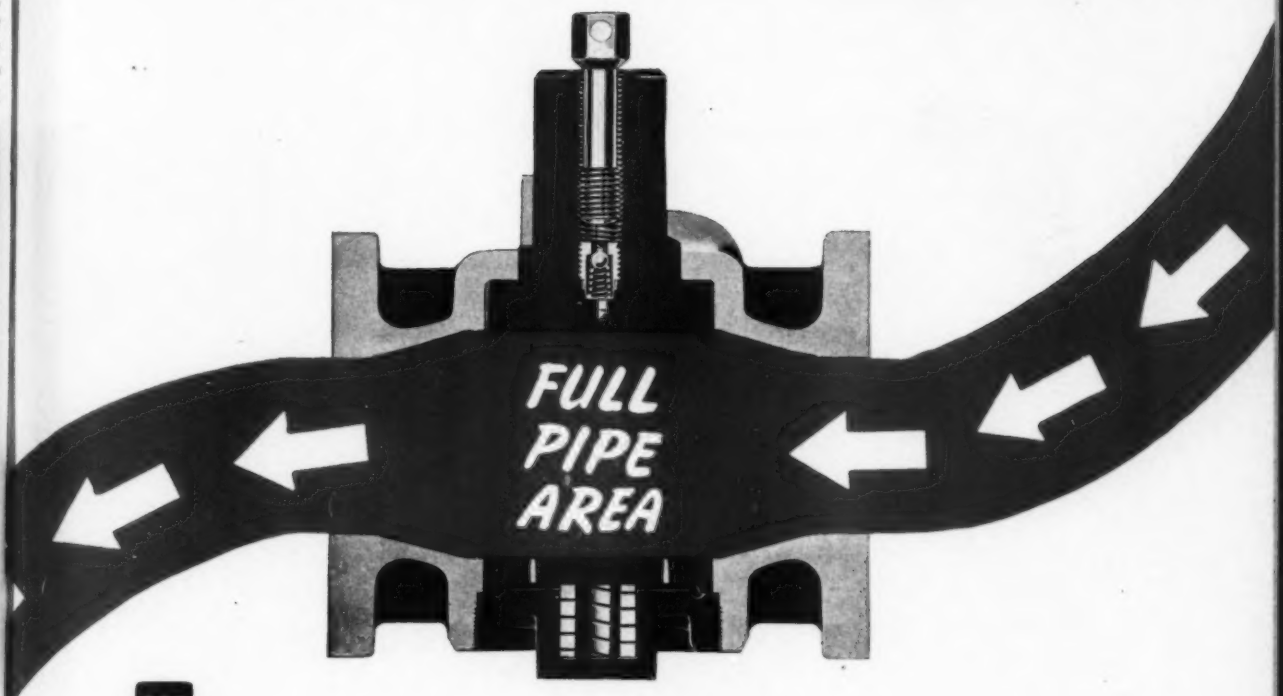
◆

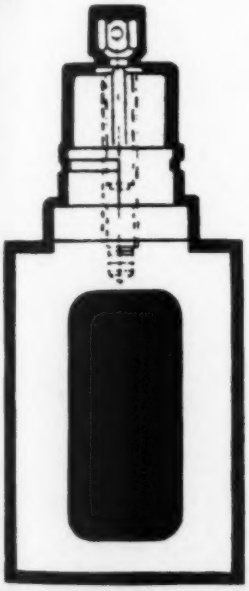
NEW POSITIONS GIVEN TO SIX MEMBERS OF P.M.C. DEPT.

New positions were given to six members of the Paper Makers Chemical Department of Hercules Powder Company on May 1.

Thomas G. Batchelor, resident manager of Hercules Powder Company (Canada) Ltd., is now assistant director of sales of the department at Wil-

1/4 TURN OPENS TO FULL FLOW





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Other types of plug construction *reduce* the port opening and restrict the flow by as much as 42%. Why restrict flow in your pipe line when you can obtain Full Flow? Try a.c.f. Lubricated Plug Valves in your own operations and learn the difference. Representatives in principal cities carry adequate stocks. For a description of types and complete specifications write for catalogue 3-PI.

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Interleaved Rolls	Web Supercalenders
Paper Rolls	Friction Calenders
Embossing Rolls	Embossing Calenders
Chilled Iron Rolls	Laboratory Calenders
Sheet Calenders	Rag and Stock Cutters

Mullen Testers

mington, Delaware. He has been resident manager of the Canadian subsidiary since 1937, and was elected to the board of directors last September.

E. Hoke Martin, PMC sales representative at Kalamazoo, Michigan, succeeds Mr. Batchelor as resident manager of the Canadian plant at Freeman, Ontario. He has been succeeded at Kalamazoo by Henry Reeves, Jr., formerly of Wilmington.

Henry L. Mellen, formerly sales representative at Holyoke (Mass.), has been appointed assistant manager at that location.

Thomas L. Stirling, formerly with PMC's Department in New York City, has joined the paper chemicals sales staff at Holyoke. He is succeeded in New York by L. E. McKenzie, formerly resident manager of the Industrial Chemical Division's Boston office.

◆

GEO. TORRENCE RETURNS TO LINK-BELT AS EXEC. V.P.

George P. Torrence, who resigned from the presidency of Link-Belt Company, Chicago, in 1936, will rejoin the company on July 1 as executive vice president. The announcement of Mr. Torrence's return was made by William C. Carter, president of the company, at a special meeting of the board held on May 7. Mr. Carter further announced that when he retires as president on November 1 (in accordance with the company's retirement plan), Mr. Torrence will then become president of the company.

G. P. Torrence

Since leaving Link-Belt, Mr. Torrence has been in Cleveland as vice president and general manager of The Rayon Machinery Corporation, a subsidiary of The Industrial Rayon Corporation, and as president of The Cleveland Pneumatic Tool Company.

◆

SEVERAL STAFF CHANGES MADE BY KIMBERLY-CLARK

A number of changes in key positions have been announced by Kimberly-Clark Corporation.

John Wollwage is the new mill manager at the Lakeview mill in Neenah, Wisconsin. He has been assistant mill manager of the Badger-Globe mill in Neenah. In his new position, Mr. Wollwage will have co-ordinated jurisdiction over both the Lakeview and the Badger-Globe mills.

Ralph Kehl, who became mill manager of both Lakeview and Badger-Globe mills March 1, has been named assistant to the general superintendent with headquarters in the main office at Neenah.

Dean Anderson has been named plant engineer of the Lakeview mill, succeeding Keith Martiny, who is now working as assistant to Joe Foley with headquarters at Kimlark, new home of the corporation's engineering department. Mr. Martiny will be working on maintenance of the creped wadding manufacturing plants.

Howard Palmer, assistant mill manager of the Lakeview mill, is now resident manager at Badger-Globe.

George Klock has been appointed mill superintendent of operations at the Canadian Cellucotton Products Company, Niagara Falls, Ontario.

George Clark, former assistant general superintendent for the Camden (Ark.) mill of International Paper Company, is a new staff member. He is working under W. H. Swanson on the development of sulphate pulp, which will be produced at the Canadian plant to be built by K-C subsidiary LongLac Pulp and Paper Company, Ltd.

◆

CLEVELAND CRANE & ENGRG. WKS. ELECTS NEW OFFICERS

New officials have been announced by The Cleveland Crane & Engineering Company, Wickliffe, Ohio.

Herbert T. Florence, who has been general manager of the company since 1938 and vice president since 1941, has been elected president and general manager. A. C. Garnett, formerly secretary and treasurer, is now vice president and treasurer. W. G. Wehr is now secretary, and W. D. Vanderbilt is assistant secretary.

Herbert T. Florence

A. C. Garnett

ASST. SECRETARY IS ELECTED BY M. AND O.

The board of directors of Minnesota and Ontario Paper Company, Minneapolis, met on April 22 and elected Hadlai Hull assistant secretary of the company. Before entering the Navy in 1941, Mr. Hull practiced law in New York City. He was released from service late in 1945 with the rank of Commander.

Hadlai Hull

◆

▶▶▶ Since first joining Detrex Corporation, Detroit, in 1936, *S. H. Bivins* has been the company's divisional manager in Milwaukee and St. Louis. He has now been appointed manager of Detrex Western Regional Industrial Sales, and will have headquarters in Chicago.

▶▶▶ New appointees at The Permutit Company, New York City, are *H. L. Boehner*, technical manager, and *A. D. Way*, chief mechanical engineer.

H. L. Boehner

Mr. Boehner will be responsible for the company's technical policy on the application, guarantee, and performance of its products. He also will serve as chairman of the engineering committee. Mr. Way will administer the engineering department and supervise the mechanical design and layout of equipment.

A. D. Way

◆

▶▶▶ After 44 years with the company, *Louis Asmus* has retired from active service at the Kimberly-Clark Corporation plant in Neenah, Wisconsin. He was one of the charter members of the Old-Timers Club.

▶▶▶ Assistant research supervisor is the appointment given to *Dr. John F. Gall* by the Pennsylvania Salt Manufacturing Company, Philadelphia. At the company's Whitemarsh Research Laboratories, he will assist in the coordination of the experimental activities of the Research division of Pennsalt's Research and Development Department.

◆

▶▶▶ Released from the Army after three years of active duty, *Donald Peller* has joined the E. P. Lawson Company, Inc., New York City, as sales representative. He will represent Lawson, manufacturer of paper cutters and bindery equipment, in the New York area and on the East coast.

◆

▶▶▶ A newly-created position of assistant to the president of Masonite Corporation, Chicago, has been announced by Eugene Holland, president of that company. Appointed to fill the position is *John M. Coates*, who has been general counsel of the company since 1941.

◆

▶▶▶ Stein, Hall & Co., Inc., has promoted two salesmen to be assistant manager of its New York branch. *E. M. Clevan* has been a member of the New York sales staff since he returned from World War I. *D. H. Lipman* joined the company's New York sales staff in 1938. He entered the Navy in 1944, and was honorably discharged early this year with the rank of Lieutenant U. S. Naval Reserve.

◆

▶▶▶ The new editor-in-chief of the *Journal of Forestry* is *Dr. Hardy L. Shirley*, assistant dean of The New York State College of Forestry, Syracuse University. The *Journal of Forestry* is a professional publication devoted to all branches of forestry. It is issued monthly by the Society of American Foresters.

◆

▶▶▶ The new president of the Association of Washington Industries is *Ferdinand Schmitz, Jr.*, president of the Everett Pacific Shipbuilding and Drydock Company, and formerly with Rayonier, Inc., at Shelton, Washington. Vice presidents include Ralph M. Roberg, of the Puget Sound Pulp and Timber Company, Bellingham, Washington. U. M. Dickey, of Soundview Pulp Company, Everett, Washington, is one of the directors.

◆

▶▶▶ Formerly with the Melting Department of the Iron and Steel Foundry Division of the Crane Company, at Chicago and at its plant in Chattanooga (Tenn.), *Homer W. Northrup* recently joined the Chicago Technical Section of The International Nickel Company, Inc. He will be associated with the foundry activities of INCO in the Chicago territory.

◆

▶▶▶ The Military Cross for devotion and gallantry in action during December, 1941, at Hong Kong, has been awarded to *Major F. T. Atkinson*, of the Royal Rifles of Canada, Quebec City. In civilian life, Major Atkinson is purchasing agent of the Anglo-Canadian Pulp & Paper Mills, Ltd., Quebec City.

◆

▶▶▶ At the annual meeting of the National Junior Achievement Corporation, held in Springfield, Massachusetts, recently, *Horace A. Moses*, chairman of the board of Strathmore Paper Company, West Springfield (Mass.), was elected honorary president. Mr. Moses, who was founder of the Movement, was elected a member of National Junior Achievement, as were also President *George Williamson* and vice president-treasurer *F. Nelson Bridgham*, of Strathmore.

◆

▶▶▶ The second technician from China to be stationed at Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin, is *Wang Lien*. He is studying American methods of papermaking in connection with the Foreign Economic Administration, and was sent to this country by his government in conjunction with the International Administration in Washington.

◆

▶▶▶ Chairman of the board of Strathmore Paper Company, West Springfield, Massachusetts, *Horace A. Moses* celebrated his 84th birthday on April 21. Born in New York State, Mr. Moses went to West Springfield in 1933 and went to work for the old Agawam Paper Company. Besides his connection with Strathmore, he is connected with the Rising Paper Company, Housatonic, Massachusetts, Premoid Products, Inc., of Springfield (Mass.) and the Old Colony Envelope Company, of Westfield (Mass.).

◆

▶▶▶ Research associate, *Stuart O. Fiedler*, has been appointed manager of the South Chicago, Illinois, branch of the Bjorksten Laboratories. For the past several years, Mr. Fiedler has been connected with the Burgess Laboratories. Prior to that, he was for 15 years associated with the E. I. du Pont de Nemours & Company, where he was in charge of research groups.

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Take this filter installation for example . . . or any piping job. What a difference it makes when you can specify all the piping materials from one line. And when just one order gets you all the valves and fittings, pipe, accessories, and fabricated piping.

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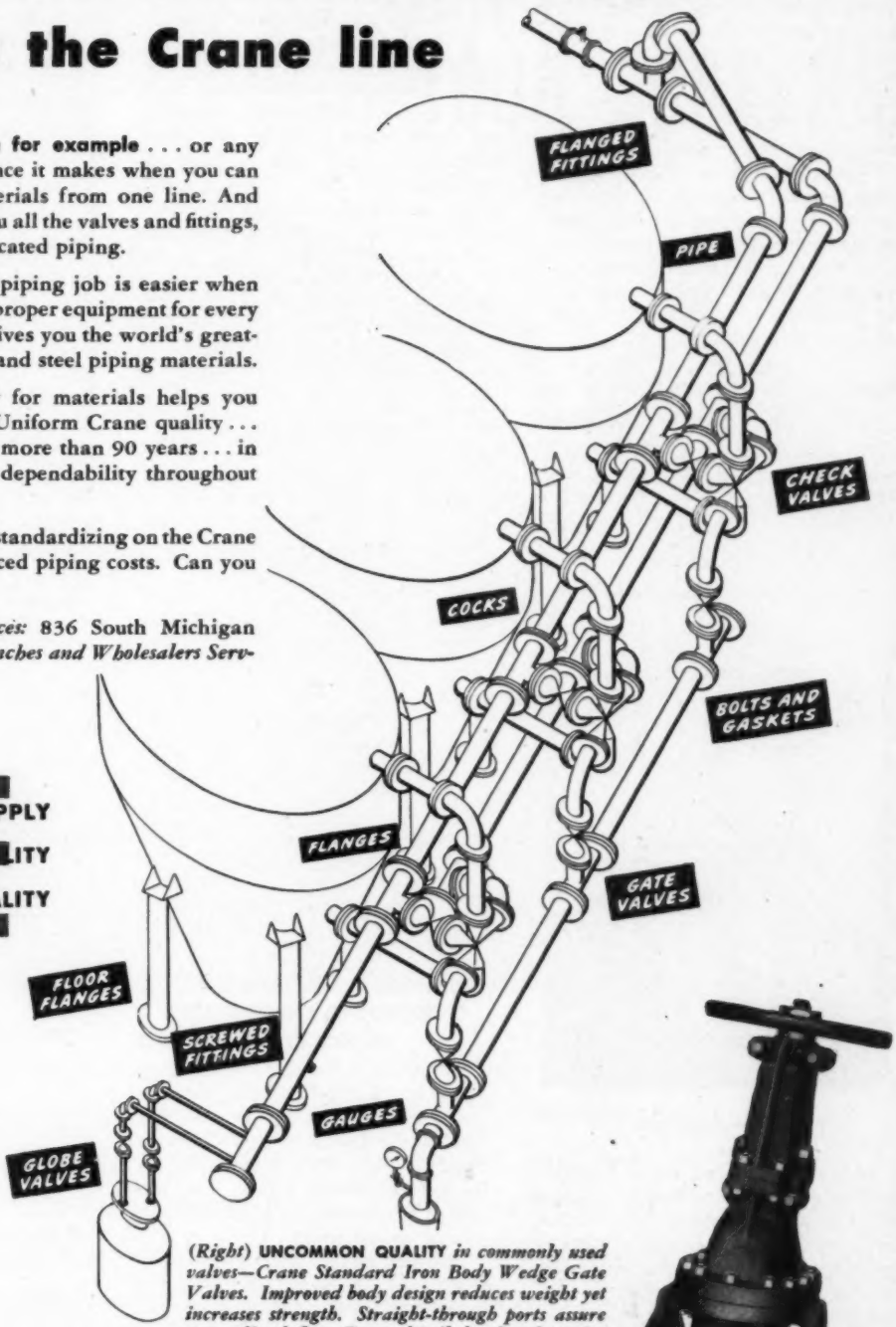
ONE



(Right) **UNCOMMON QUALITY** *in commonly used valves—Crane Standard Iron Body Wedge Gate Valves. Improved body design reduces weight yet increases strength. Straight-through ports assure streamlined flow. Every detail developed to give dependable, durable service. For steam pressures up to 125 pounds; 200 pounds cold. Patterns for every need. See Crane Catalog, page 101.*

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VALVES • FITTINGS
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FOR EVERY PIPING SYSTEM

A. E. H. FAIR NOW PRESIDENT OF ALLIANCE PAPER MILLS

The newly elected president of Alliance Paper Mills, Ltd., Merritton, Ontario, is A. E. H. Fair, who succeeds Harold Crabtree, now chairman of the board. Mr. Fair has been vice president of the company.

Other appointments include P. F. J. Dolan, formerly assistant to the manager at the Merritton Division, who has been made secretary-treasurer; and R. C. Shearer, formerly resident manager of St. Regis Paper Company, who has been appointed manager of the Merritton Division.

◆

THROCKMORTON RESIGNS CONTAINER CORP. OF AMER.

The resignation of E. A. Throckmorton, vice president in charge of sales research, Container Corporation of America, has been announced, as of June 1.

E. A. Throckmorton

Mr. Throckmorton leaves Container Corporation to become president of Container Testing Laboratories, Inc., serving the packaging industry in advisory and consulting capacities. In this independent work, he will continue to be of service to Container Corporation of America on a retainer basis.

◆

MARATHON ANNOUNCES NEW APPOINTMENTS IN MENASHA FOOD PACKAGING DIVISION

John H. Snyder has been named manager for meat and vegetable packaging of the food packaging division of Marathon Corporation, Menasha, Wisconsin. Mr. Snyder has been with Marathon for 27 years in various capacities, including several years as sales representative in the Middle West, South and Southwest.

A. J. Armstrong, who has represented the division in Wisconsin and Upper Michigan for the past three years, has been transferred to Detroit, and will serve Lower Michigan, Northern Indiana and a part of Northeastern Ohio. Two returned service men, with Marathon before the war, have been assigned to cover Mr. Armstrong's former territory. Morris W. Porter will handle southern Wisconsin with headquarters in Milwaukee, while northern Wisconsin and upper Michigan will be covered by Donald C. Mitchell.

◆

▶▶▶ The Powell River Company, Ltd., Powell River, British Columbia, has appointed *D. J. MacLaurin* control superintendent of newsprint mills. Since his graduation from the University of British Columbia in 1932, Mr. MacLaurin has been with the chemical engineering division of the British Columbia Pulp and Paper Company and the British Columbia Sugar Refining Company.

◆

▶▶▶ A new representative in the Tulsa (Okla.) area has been announced by Bowser, Inc. *George W. Cocke*, former district manager in Oklahoma for Erie Meter Systems, Inc., will handle sales of marketing equipment and petroleum inventory control systems to oil companies in that territory with headquarters at 216 East Archer Street, Tulsa.

◆

RAYMOND J. LEE TAKES OVER DUTIES OF GEN. MGR. OF LOCKPORT FELT CO.

Following a directors meeting on April 25, William H. Lee, who has been both president and general manager of the Lockport Felt Company, Newfane, New York, announced that his son, Raymond J. Lee, had been elected to succeed him as general manager of the company.

Another change was that of Lester D. Carner, personnel director, who was elected to serve as secretary, taking over that position held by B. A. Audley who resigned to become assistant to the president. Mr. Audley is also assistant treasurer.

◆

▶▶▶ After 23 years of service, *Joseph W. Elliott* recently retired as traffic manager of Fairbanks, Morse & Company, Chicago. Appointed to succeed him is *Perry G. Jefferson*, who has had wide experience in traffic work and has held important positions with railroad companies.

▶▶▶ Supervisor of fork-type lift truck engineering is the new post given to *Milton H. (Mike) Smith* by the Hyster Company, Portland, Oregon. Mr. Smith's headquarters will

Milton H. Smith

be at the home office in Portland. He has been with Hyster for four years, prior to which he was chief engineer of the Hydraulic Equipment Company, at Cleveland.

◆

MITCHELL NOW GEN. MGR. OF RIEGEL PAPER CORP.

All present officers of Riegel Paper Corporation, New York City, were re-elected at a recent meeting of the board of directors. A. P. Mitchell, secretary of the corporation was appointed general sales manager.

Mr. Mitchell joined Riegel in 1923 as a clerk and later covered both the Southern and New England territories on the regular sales staff. He was appointed sales manager of the company's coating and converting divisions in 1934 and was elected secretary in 1930.

◆

REICHHOLD PUTS RYAN IN CHARGE OF SOUTHERN DIV.

For several years vice president in charge of production, P. J. Ryan, of Reichhold Chemicals, Inc., has been made vice president in charge of the Southern Division. He has moved to Tuscaloosa, Alabama, where RCI's Southern Division plants, general offices, and laboratories are situated.

Carl B. Fritsche, who has been in Tuscaloosa since the founding of the first RCI Southern Division plant, has been appointed vice president in charge of product development.

Assisting Mr. Ryan will be Dr. C. A. Murray, plant manager; A. J. Sny-

DON'T OVERLOOK YOUR SCREENS

The paper screening operation is too important to justify any but an up-to-date installation of modern Bird Screens having the capacity and the screening action to assure:

1. Efficient dirt removal just ahead of the machine wire, protecting the wire as well as quality of sheet
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85% OF ALL THE PAPER MADE IN NORTH AMERICA PASSES THROUGH BIRD SCREENS

der, technical service; and R. B. Fellows, sales and service. All three of these men have been affiliated for some time with the main plant and laboratories at Detroit.

◆

JOHN COSTELLO RETIRES FROM J. M. HUBER, INC.

The retirement of John E. Costello, in charge of paper clay sales for the Chicago office of J. M. Huber, Inc., has been announced, effective July 1.

Mr. Costello has been closely identified with the paper and printing industry for many years. Prior to joining Huber in 1921 as Chicago branch manager, he was associated with W. F. Hall Printing Company. When Huber company entered the production of paper clays in 1931, Mr. Costello took over the middlewestern territory and has since maintained close contact with the paper mills in Wisconsin and Michigan.

◆

▶▶▶ Manager of the company's Midwestern Division, *Donald D. Pascal* has been elected an assistant vice president of the National Starch Products, Inc., New York City. Mr. Pascal has been with the company for 16 years, advancing through the laboratory and service departments.

◆

PAPER CUTTER AT CRANE RETIRES AT AGE OF 80

Frederick Roland Murray, who started work under Zenas Crane as a paper cutter at the age of 15, has retired from the position of foreman of the rag room at the Crane Paper Company, Dalton, Massachusetts, after 65 years and three months of service with the company.

The veteran papermaker states he remembers well when the company first started making currency paper—"everybody thought they were going to be rich." When Mr. Murray started work, one of the company lines was the manufacture of paper collars.

◆

NORBERT BERNHEIMER STARTS OWN CONSULTING PRACTICE

Until recently supervisor of pulp manufacture for Hollingsworth & Whitney Company, Waterville, Maine, Norbert Bernheimer has established a consulting practice with headquarters in Waterville (P.O. Box 572).

Dr. Bernheimer was a student of Dr. Schwalbe at Eberswalde, Germany, and a graduate of Darmstadt. He early attracted favorable attention because of his researches in the chemistry of Mitscherlich pulping. For twenty-four years he was connected in a managerial capacity with Vogel & Bernheimer, one of the first companies to use the Mitscherlich process.

When his mills were sold under political pressure during the Nazi regime, Dr. Bernheimer left Germany and came to the United States. He has been carrying on pulping investigations for some large sulphite pulp manufacturers in New England.

Dr. Bernheimer's services are now available to any sulphite manufacturer who wishes to improve the quality and yield of pulp.

◆

▶▶▶ The appointment of *Guy P. Sergeant*, of Reading, Massachusetts, as superintendent of the Power and Steam Division of the Brown Company, Berlin, New Hampshire, has been announced. Mr. Sergeant is a graduate of Tufts College and has been employed by the Aluminum Company of America and the American Woolen Company in supervisory positions.

◆

J. C. NUTTER NOW TECH. MGR. OF JOHN INGLIS CO.

J. C. Nutter has been appointed technical manager of the pulp and paper machinery division of John

Eliminate Down Time!

. . . ON SUPER CALENDERS, COATERS, AND IN ALL CONVERTING OPERATIONS

Down Time Means } Loss and Waste; Erratic Quality Control; Increased Cost Per Ton

YOU CAN'T AFFORD DOWN TIME IN POST-WAR COMPETITION

The Kohler System

of continuous unwinding and rewinding with full speed change of rolls

Eliminates Down Time!

The Kohler System Company

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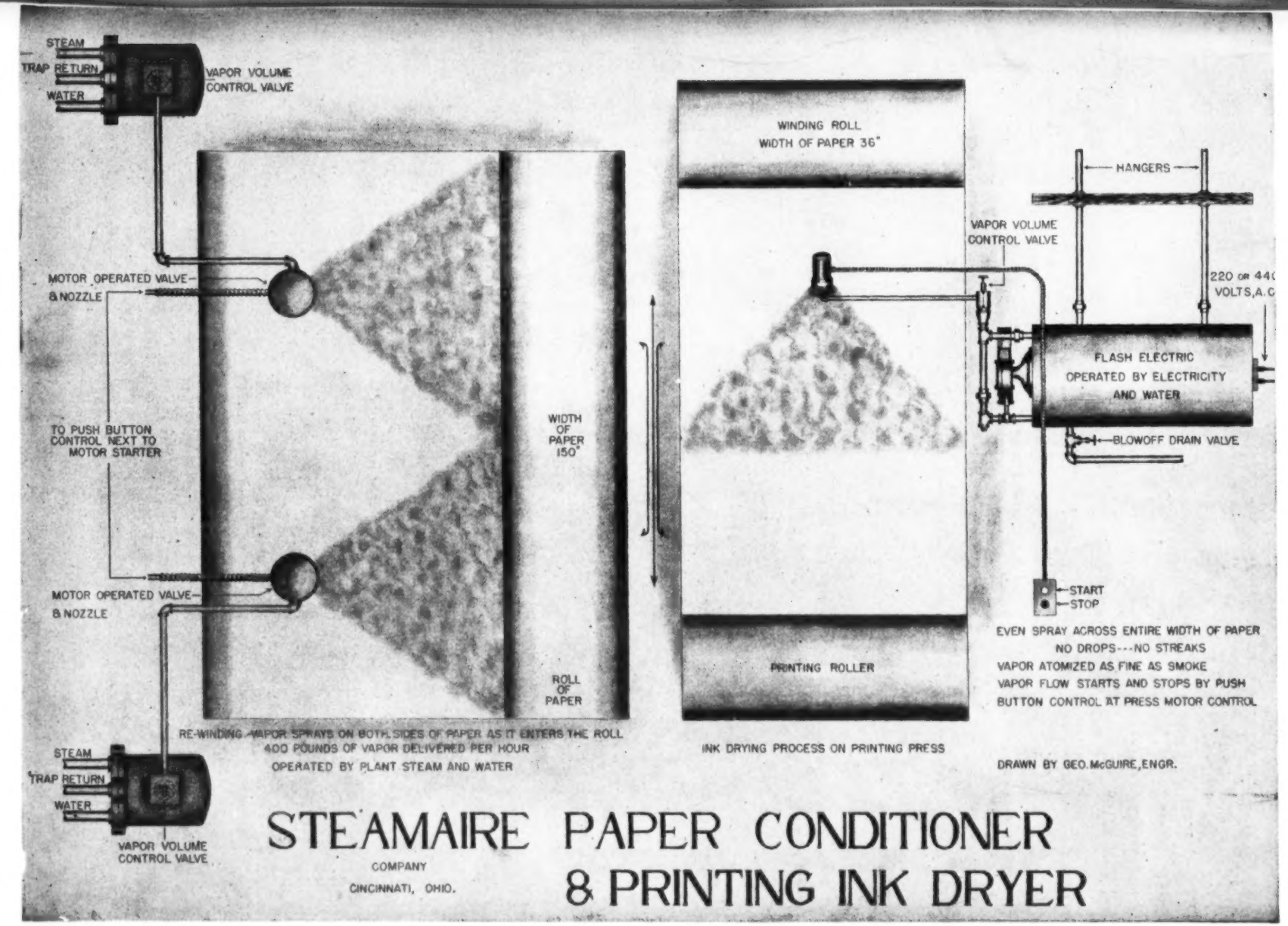


STEAMAIRE PAPER CONDITIONER & PRINTING INK DRYER

COMPANY

CINCINNATI, OHIO.

Inglis Company, Ltd., Toronto, Ontario. Continuously employed in the pulp and paper industry since graduation from McGill University in 1921, Mr. Nutter has held responsible positions with several Canadian and United States companies.

John Inglis Company manufactures in Canada Pusey & Jones paper machines, both cylinder and fourdrinier, also Goslin-Birmingham multiple effect long-tube evaporators for the chemical pulp industry.

◆

▶▶▶ *Robert Nivison, Jr.,* has been appointed administrative assistant to the vice president and manager of mills at Waterville, Maine, according to an announcement made recently by Hollingsworth & Whitney Company. For a number of years prior to his association with Hollingsworth & Whitney Company, Mr. Nivison was an engineer and sales representative for the Improved Paper Machinery Corporation.

◆

▶▶▶ *R. W. Shaver* has been appointed head of the paper mill division of Continental Can Company, which recently purchased the Gould Paper Company plant at Lyons Falls, New York. The division also will include the mill at Filer City, Michigan. Mr. Shaver, who was general manager of the Gould company when it was acquired by Continental, will retain his headquarters at Lyons Falls.

◆

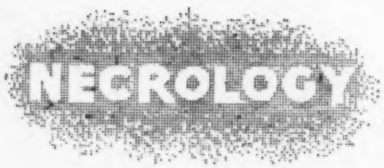
E. HOWARD SMITH ELECTED PRES. HOWARD SMITH PAPER MILLS TO SUCCEED CRABTREE

President of Howard Smith Paper Mills, Ltd., Montreal, Quebec, since 1930, Harold Crabtree has relinquished that position to become chairman of the board. Succeeding to the presidency is E. Howard Smith, who for the past 13 years has been vice president in charge of sales. E. Keith Robinson, for the past 13 years vice president in charge of operations, has been appointed executive vice president.

At the special meeting prior to the annual meeting, unanimous approval was given to the plan to refund the existing 6 per cent preference stock by a new issue of $2 cumulative $50 par value preference stock.

◆

▶▶▶ Since returning from service in the Navy last year, *Thomas S. Stirling,* formerly with Paper Makers Chemical Division of Hercules Powder Company at Holyoke, Massachusetts, has resigned from that company. He has joined the sales force of the Oxford-Miami Paper Company, Dayton, Ohio.



JEAN ROLLAND

Jean Rolland, since 1928 president of Rolland Paper Company, Ltd., Mont Rolland, Quebec, passed away at his home in Mont Rolland on April 4 at the age of 67.

Mr. Rolland was born in Montreal and in 1898 he joined the Rolland Paper Company, which had been established by the Rolland family in 1882. From 1902 to 1918 he managed the company's mills at Mont Rolland, and from 1918 to 1928 he was general manager of its St. Jerome mills. He was one of the organizers and founders of the Canadian Pulp & Paper Association.

Surviving are the widow, six sons and two daughters.

◆

GERARD B. CLORAN

Gerard B. Cloran, manager of the advertising and sales promotion department of National Starch Products, Inc., New York City, passed away April 28. Mr. Cloran, who was only 38 years of age, had been connected with the organization for 13 years. He was a member of the Direct Mail Advertising Association, and had served on many industry committees including the Packaging Council of the American Management Association and the Adhesives Manufacturers Association of America. He had contributed numerous articles to the trade press on various aspects of sales promotion and on uses of adhesives.

Surviving are the widow, father, mother, and a brother.

MANVEL HOMER COOMBS

President of the Kalamazoo Tank and Silo, the Riverside Foundry and Galvanizing, and the Kalamazoo Clay companies, Manvel H. Coombs passed away April 23 while on a short business trip.

Mr. Coombs was born in Iowa. He graduated from Purdue University, and in 1913 he joined Homer Manvel in the Kalamazoo Tank and Silo Company. After the passing of Mr. Manvel in the late 1920's, he became president of the company.

He is survived by his widow, a daughter, and a son.

◆

WOOLSEY W. WEED

President of F. C. Huyck & Sons, Kenwood Mills, Albany, New York, since 1938, Woolsey W. Weed passed away at his home in Albany on May 12.

Mr. Weed was born at Potsdam, New York, and attended Syracuse University. He joined the firm of F. C. Huyck & Sons in 1917 and had been connected with the company continuously for the past 29 years. For 17 years he was managing director of Kenwood Mills, Ltd., Arnprior, Ontario, Canada. When F. C. Huyck, president of the company, passed away in 1938, Mr. Weed came to Albany as president and a director of the parent company. He served on the War Production Board during World War II.

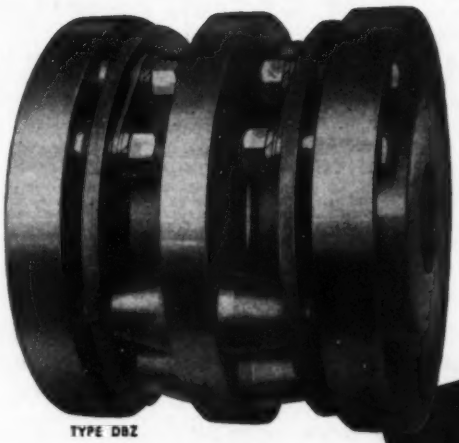
Surviving are the widow and a son, William.

◆

▶▶▶ *Charles Ernest Guyton,* president of the Roofing Machinery Manufacturing Company, Chicago, passed away April 27. He is survived by his widow, a son, and two daughters.

THOMAS *Flexible* COUPLINGS

. . . proven to be 100% dependable on wood choppers, centrifugal pumps and other heavy duty machinery in the paper manufacturing industry



TYPE DBZ

Today's modern high-speed paper manufacturing machinery requires couplings with all the important features built into the couplings designed by Thomas Engineers.

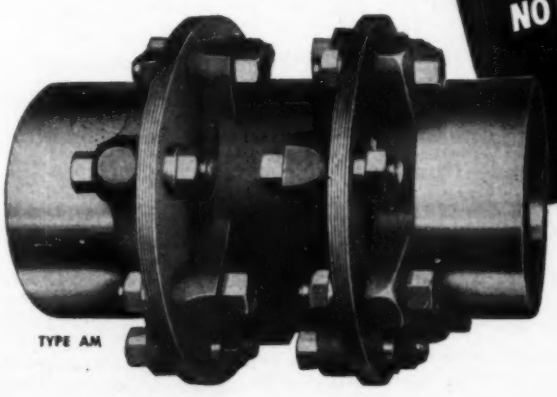
Thomas Couplings are in perfect balance under all conditions of misalignment.

BACKLASH, FRICTION, WEAR and CROSS-PULL ARE ELIMINATED

NO LUBRICATION IS REQUIRED!

Torsional characteristics remain constant regardless of length of service.

The Longer Life of Thomas Flexible Couplings, without costly interruptions and replacements will add much to Your Operating Profits!



TYPE AM

Thomas All-Metal Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

Write for our Complete Engineering Catalog!

THOMAS FLEXIBLE COUPLING COMPANY

WARREN, PENNSYLVANIA

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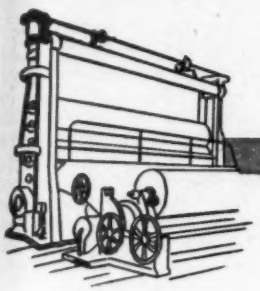
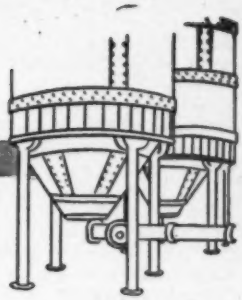


Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Procedure for Attaching Nozzle to a Length of Lead Lined Steel Pipe

It is advantageous to locate the nozzle near the flange at either end of the length of lead lined steel pipe. In that way, access to the inside of the pipe is sufficiently free, in most instances, to permit the lead burning of the lead sleeve of the nozzle to the lead lining of the steel pipe.

The length of pipe involved should be removed from the line, after which a cutting torch should be employed to cut the requisite hole through the steel casing and the lead lining.

A sheet of asbestos is inserted inside of the lead lined steel pipe to prevent damage to the lead lining from weld spatters during the cutting of the hole.

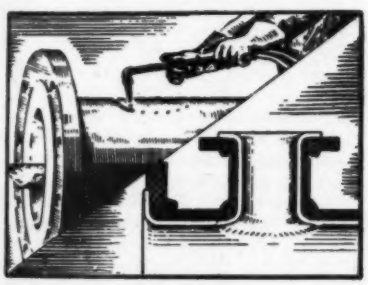


Figure 1

The nozzle should be carefully shaped, so that it will provide an exact fit when inserted into the steel pipe (Figure 1). In this connection, a most important point is the beveling or rounding of the edges of the nozzle, so that the lead lining, which runs through the nozzle, will encounter no sharp cutting surface when the line is in use.

The lead lining around the hole which has been cut in the steel pipe should be carefully loosened, so as to provide an air space between the steel pipe and the lead itself. In this way the heat developed during the electric welding of the nozzle to the steel pipe, will not materially injure the lead.

When the nozzle has been carefully fitted and welded in place, as shown by the illustration, the pipe should be turned, so that the nozzle faces in a downward position. Mechanics should be careful to remove all welding debris from the pipe, and the fit of the nozzle as well as the smoothness and roundness of its edges should be carefully examined to make sure that there are no sharp points present.

Sharp points should be removed by

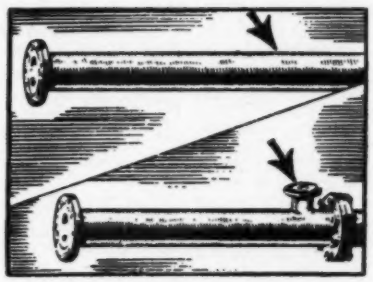


Figure 2

rasping or filing, being careful to prevent such filings from lodging in the back of the loosened lead.

When this has been carefully accomplished, a competent lead burner should proceed to clean and round up the edges of the lead, so that a circular hole exists in the lead lining. This hole should be just sufficiently removed from the hole in the nozzle to insure a flat burned seam when making a joint.

A lead sleeve should now be inserted in the nozzle, in accordance with common procedure. The lead sleeve should pass through the nozzle to the inside of the pipe, and should be gently flared so that the edges of the flare match up well with the circular cut in the lead lining as previously described.

Care should be taken to make sure that all lead has been dressed tightly against the steel pipe and nozzle. When this has been accomplished, the lead burner should burn a careful, adequate, full depth seam.

Where it is not desirable to locate a nozzle close to either end of the expanded lead lined steel pipe, and where for some special reason it is not practical to run a branch or connection from that location to the desired point, the following procedure (Figure 2) may be employed:

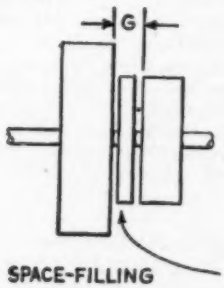
The length of pipe involved should be removed from the line and cut at the required place. After this, both lengths of pipe should be threaded, and a suitable lead lined flange attached and lead burned in place. The lead lined nipple itself should be welded and lead burned in place, as previously described.—AMERICAN SMELTING AND REFINING COMPANY, *Lead Products Division, Lead Lined Products Section.*

◆

Safety Pulley Sometimes Needed

If the space "G" between two pulleys is less than 1.5 times the width of the wider adjacent belt, the situation may be dangerous. In the event that a belt runs off its pulley it is likely to get caught between the two adjacent pulleys and be broken or ruined, and it may even pull the shafting, pulleys and hangers down onto the heads of the workers below.

This condition is easily remedied by placing a safety pulley in the vacant space, so that neither belt can drop into it and get caught. The diameter of this additional pulley should not be less than the diameter of the smaller pulley, nor greater than the larger pulley.



SPACE-FILLING

Also, when a belt runs off a pulley that is located adjacent to a hanger, the situation is hazardous unless provision is made to prevent catching of the belt between the hanger and pulley. It can usually be done by attaching a hook or guard to the hanger in such a way that the belt will drop onto the hook or guard when it runs off the pulley. Entangling then will be impossible.—W. F. SCHAPHORST.

◆

Handling of Cotton Rolls in Supercalenders

1. Never sand out a soft spot or try to level off a ridge in your paper with a cotton roll stack. The cotton rolls at all times must be level all the way across. The high spots will burn and will crack, so the first thing to look for is hot spots across the roll.

Should the temperature reach over 180 deg. Fahr., wash the rolls down with warm water for about half an hour. Keep close watch while doing this or rolls will become tacky and require rolling out longer.

2. Do not carry any more weights than necessary on the levers. Do everything possible to keep rolls from getting too hot.

When changing from one width roll to another, if the new size is wider, sand all the way across the face of the roll. Then wash down with warm water with low weight pressure, and gradually bring pres-

sure up above the weights expected to be used.

3. When the stack is shut down, drop to slow speed and run until the cotton roll drops to a temperature of at least 100 deg. Fahr.

4. When stack is started after being shut down, turn over at slow speed. Build up pressure gradually.

5. When a roll is marked, wet it down with water that is quite hot, not boiling though, and try to run the mark out. Use fast speed, plenty of pressure.

6. When running narrow width rolls, watch the ends. (We generally taper them off with sanding; just enough not to heat up.)

7. When the crust on the outside of the cotton rolls becomes dead, the roll should be sanded all the way across, and then run up as stated in No. 2.

8. Keep the hardest rolls on bottom of stack.

9. If a new roll is put in the twin position, be sure the other roll is refinished too—that is, be sure both rolls have a level surface all the way across.

10. When rolls start squeaking, watch for trouble as this means they are getting loose on their cores.

11. To wash cotton rolls, use hot water and soap. Wet down rolls until they feel tacky and soften a little. Then run up as stated in No. 2. (We take 8 hours to sand and condition a stack of cotton rolls.)—WILLIAM R. STAPLEY.

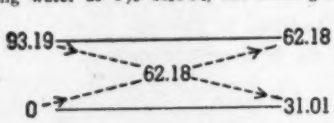
◆

Rectangle Method for Calculating Liquid Dilutions

The rectangle method offers a quick and accurate means of solving certain problems involving the dilution of liquids.

For example: Suppose it is desired to know the amounts of 66 deg. Baumé sulphuric acid and of water necessary to make 100 pounds of 50 deg. Baumé sulphuric acid.

From a sulphuric acid table, we find that 66 deg. Baumé acid contains 93.19% H_2SO_4, and 50 deg. Baumé, 62.18% H_2SO_4. Using these figures, and considering water as 0% H_2SO_4, the rectangle is



Rectangle A

set up by placing the desired strength in the center, the strengths of each original solution on the left-hand side, and by subtracting the smaller numbers from the larger ones along the diagonals, as shown in Rectangle A.

In the above example, 62.18 pounds of 66 deg. Baumé sulphuric acid (93.19% strength) and 31.01 pounds of water (0% strength) will be required to make 93.19 pounds of 50 deg. Baumé acid (62.18% strength).

Since originally it was desired to find the quantities of 66 deg. Baumé sulphuric acid and water necessary to produce 100 pounds of 50 deg. sulphuric acid, the above quantities must be multiplied by 100 ÷ 93.19 or 1.0731.

Therefore,

62.18×1.0731=66.73 lbs. 66 deg. acid
and
31.01×1.0731=33.27 lbs. water

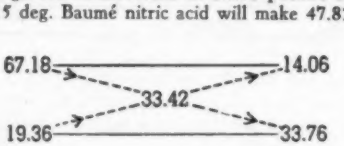
will make 100.00 lbs. 50 deg. acid

If the problem were to find the quantity of 42 deg. Baumé nitric acid required to strengthen 300 pounds of 15 deg. Baumé nitric to 25 deg. Baumé, the procedure would be similar to the above. From a nitric acid table, we find the strengths to be as follows:

15 deg. 19.36% HNO_3
25 deg. 33.42% HNO_3
42 deg. 67.18% HNO_3

The rectangle would then appear as in Rectangle B.

This shows that 14.06 pounds of 42 deg. nitric acid added to 33.76 pounds of 15 deg. Baumé nitric acid will make 47.82



Rectangle B

pounds of 25 deg. Baumé nitric acid. Since there were 300 pounds of the 15 deg. Baumé nitric acid, the above quantities must be multiplied by 300 ÷ 33.76 or 8.886.

This method of calculation can be applied to any problem of a similar nature in which the two solutions being mixed are similar or where one is water, and in which the strengths of the solutions are known.—*Adapted from* GENERAL CHEMICAL COMPANY PRODUCTS BOOK.

◆

Hints on the Operation Of Centrifugal Pumps

Experience has shown that except for mechanical defects, approximately 85 per cent of the troubles experienced with centrifugal pumps occur on the suction side of the unit. To locate trouble check the following points:

1. No Liquid Delivered.

a) Improper priming—This is indicated by incomplete filling of the suction pipe and casing with water. Check the operation of the priming system. Check the suction line and stuffing box for air leakage into the pump.

b) Speed is too low—Check the motor connections for proper voltage.

c) Discharge head is too high—Check the static discharge head. This must be lower than the discharge head developed by the pump in order to obtain flow. At the same time, check the pipe friction so that the correct total head required can be compared with the rated total head of the pump. If the static and friction heads cannot be reduced, an impeller of larger diameter will be required. Make sure that all of the valves are open and that the pipe is not clogged by scale or dirt.

d) Suction lift is too high—The friction loss may be too high due to suction piping that is too long or too small, or due to restriction in the foot valve or strainer. The static suction lift may be too great. Correct by reducing the length of the suction pipe, increasing the size of the suction pipe, raising the level of the water or by lowering the pump. Clean the strainer. The total dynamic suction lift should be kept within 15 feet whenever possible when handling cold water.

e) Impeller passages are completely plugged—Remove the casing cover or the suction head and clean out the impeller passages.

f) Incorrect rotation—Make sure that the arrow on the pump indicates the correct rotation. Make sure that the driver rotates in the same direction as the pump before connecting the coupling.

2. Not Enough Liquid Delivered.

a) Air leaks in the suction pipe—Make sure all of the joints in the suction pipe are tight. If non-explosive liquids are being handled, check the joints with a candle flame or match. If the liquid is inflammable, such as gasoline, test the suction pipe by plugging the inlet and put the line under pressure. If possible, blank off both ends of the suction line before connecting it to the suction flange, and put the line under pressure and check for leaks.

b) Air leaks in the stuffing boxes—Make sure that the boxes are packed correctly and that the seal cage is in the proper position. Make sure that the sealing-liquid passages are not plugged and that a sufficient amount of sealing liquid is flowing from the stuffing box while the pump operates. Make sure that the parting-flange bolts are tight.

c) Speed is too low—Check the speed with a tachometer or other approved device.

d) Suction lift is too high—The pump capacity decreases as the suction lift increases. (See d under item 1.)

e) Suction-pipe entrance is not submerged enough, causing whirlpools and allowing air to enter the suction pipe. Provide more submergence over the suction pipe entrance. A floating baffle fastened to the suction pipe will help break up whirlpools around the suction-pipe entrance.

f) Impeller passages are partially plugged—Shut the pump down, closing the suction valve just before the pump stops. By doing so any pieces of wood or foreign matter will remain in the impeller and can be located when the pump is opened up; otherwise, the piece of wood, etc., may be washed back through the pump and suction pipe and never be located.

g) Discharge head is too high. (See c under item 1.)

h) Air pockets in the suction line. (See piping section.)

i) Foot valve is too small or is partially obstructed. The area through the foot-valve ports should be not less than 1½ times the area of the suction pipe. Clean the foot valve and strainer periodically.

j) Incorrect rotation. (See f under item 1.)

k) Not enough positive head on the suction when handling hot water or volatile liquids—This condition is indicated by a fluctuating suction gage and noise in the pump suction passage. Correct by providing more suction head.

l) Mechanical defects—Wearing rings are worn. Impeller is damaged from erosion. Shaft sleeves and packing are worn. Inspect the pump periodically and replace worn or defective parts.

m) Impeller diameter may be too small—Check with the pump manufacturer for the correct impeller diameter for the required total dynamic head.

3. Not Enough Pressure.

a) Speed is too low. (See b under item 1.)

b) Liquid contains air or gas—It may be necessary to locate an "air separator" in the suction line close to the suction flange. The condition may possibly be corrected by overrating the pump or using an oversized unit.

c) Mechanical defects. (See l under item 2.)

4. Pump Works for a While and Then Stops Pumping.

a) Leaky suction line. (See a under item 2.)

b) Air leaks in the stuffing box. (See b under item 2.)

c) Water seal is not operating properly. (See b under item 2.)

d) Air or gas in the liquid. (See b under item 3.)

e) Suction lift is too high. (See d under item 1.)

5. Pump Takes Too Much Power.

a) Total head is lower than rated—A centrifugal pump will handle a greater capacity at a lower head, unless limited by the suction lift, and it will take more power. Check the head and check with the pump manufacturer for the correct impeller diameter for the required head and capacity.

b) Speed may be too high—The brake horsepower of a centrifugal pump varies as the third power (cube) of the speed; therefore, any increase in the speed means considerable increase in the power.

c) Liquid may be heavier or more viscous than pump was designed to handle—Check the specific gravity and the viscosity of the liquid being pumped and consult the pump manufacturer for the correct impeller diameter and the horsepower requirement, as a driver of greater horsepower may be necessary.

d) Stuffing boxes are too tight—Reduce the gland pressure. If the sealing water does not flow, check the packing and the shaft sleeve, replacing them if they are worn. Make sure that the sealing cage is in the correct position.

e) Mechanical defects. (See l under item 2.)

f) Rotor is binding—Check all the internal wearing parts for proper clearance.

g) Misalignment—Check the alignment of the pump and driver.

h) Electrical defects—The voltage and frequency of the electric current may be lower than that for which the motor was built; or there may be defects in the motor. The motor may not be ventilated properly due to a poor location.—*Cameron Pump Operators' Data*, INGERSOLL-RAND CO.

◆

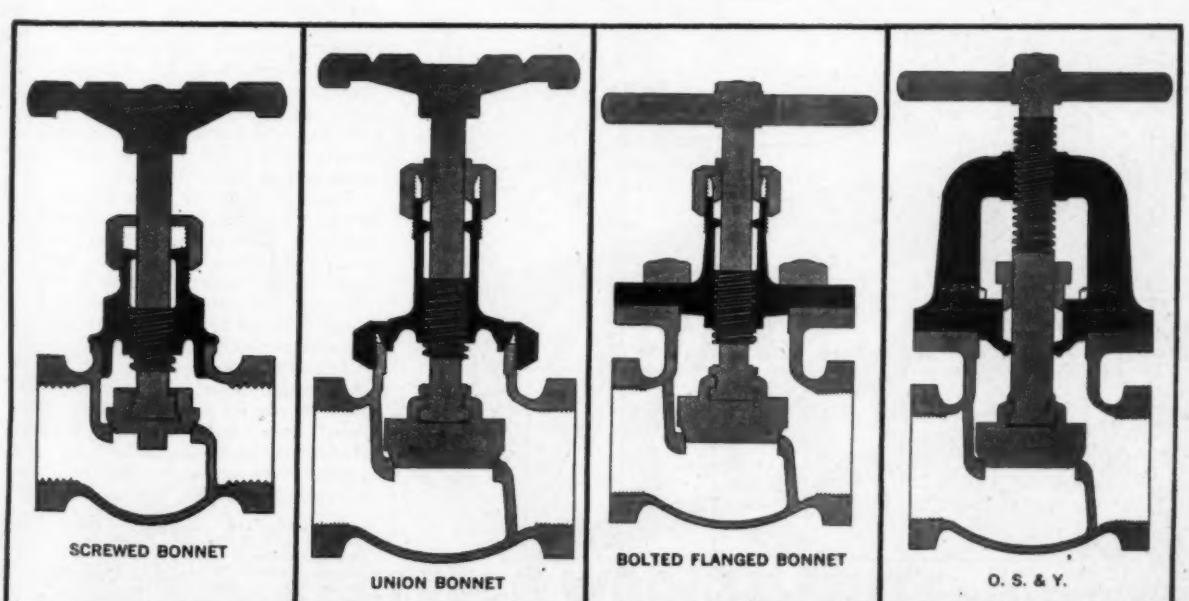
Different Types of Bonnet Design in Globe and Angle Valves

A. There are four types: screwed bonnet; union bonnet; bolted flanged bonnet with inside screw rising stem and bolted flanged bonnet with outside screw rising stem and yoke (O. S. & Y.). Their characteristics are as follows:

Screwed Bonnet. As shown in the illustration, the outside of the base of the bonnet and the inside of the neck of the body are threaded. Thus the bonnet is attached to the body by screwing it into the body neck. This is the simplest and therefore the most inexpensive type to make and is generally used in low pressure services. However, the operation of screwing the bonnet firmly into the body neck to make a tight seal tends to spread the neck. It is, therefore, more difficult to make a tight seal again after the valve has been taken apart for reconditioning.

Union Bonnet. This design provides a quick, easy method of coupling and uncoupling the bonnet and valve body, and is, therefore, especially favored where the use of soft metal or composition discs requires periodical uncoupling of the bonnet to make replacements. The union bonnet provides a tight closure with a minimum of effort. The bonnet is provided with a bevel which engages against a corresponding bevel in the body neck. The heavy hexagonal ring nut can be readily wrenched down to provide an absolutely tight seal. Furthermore, pressure within the valve body tends to seal the joint even more tightly. And, as all parts are in compression and firmly held in place, distortion is unlikely and the bonnet can be detached and tightly sealed in place again any number of times.

Bolted Flanged Bonnet. When the larger sizes of globe valves are required, the sturdy bolted flange connection is recommended. In this, the two flanges, properly gasketed, are bolted together with an ample number of through bolts or studs to provide positive purchase on the gasket. There are two types, as illustrated: the inside screw rising stem, with the stem threaded through the base of the bonnet (as in the screwed or union types) and the outside screw rising stem and yoke (O. S. & Y.), with the stem threaded through the upper part of the yoke arms. This type has a bolted packing gland and an extra large stuffing box. It is not only the sturdiest design but also provides the advantages of the outside screw rising stem.—THE WM. POWELL CO.



Moldable Paper Products*

HAROLD R. ALLEY
Research Director
Arvey Corporation

The economic worth of the modern paper converter is measured in terms of his ability to take standard paper items from the mills and convert them into either improved or entirely new products for specific end uses. These products must be attractive, useful, perfectly engineered, and fully competitive with other materials such as foils, synthetic films, cloth, etc.

Research chemists look upon paper as being just another raw material consisting of matted wood or other fibers with or without a few extra frills. The newer end uses call for many new and improved properties in the base material. For example, where can we find:

Paper that is as transparent as glass?

Paper that is bacteria-proof?

Paper that is bacteria free?

Paper that has 100% water resistance?

Paper that has a zero moisture-vapor transmission rate?

Paper that is as inert as glass?

Paper that is an all-around perfect barrier?

Paper that is as moldable as soft metal foil?

Paper that has the machine forming properties of certain metals?

Paper that is as pliable as Pliofilm?

Paper that is as wrappable as .001 2S-O aluminum foil?

Since paper is a relatively low cost raw material, the answers to some of these questions are a challenge to both chemists and American industry as a whole. Each question involves a rather broad research project in itself. A satisfactory solution to any of the problems involves research manpower, industry-wide co-operation, and persistent effort on the part of one or more inspired mill or converter research groups. It appears that our economic system offers ample rewards to an individual who or a group which solves any of these rather basic technical problems.

Before World War II, an old-time kraft paper-man asked how he could deliver his paper to the customer with a high moisture content to insure improved wrapping properties as compared to extremely dry paper. His inquiry simply indicated that he was not satisfied with the wrapping properties of kraft paper. After attempting to wrap a penny match box with 60 lb. kraft containing 0%, 5%, and 10% moisture, it appeared that heavy kraft paper had a very low wrappability factor, when compared to .001 inch lead foil. This physical characteristic was a bit disturbing especially when the biggest use of the paper is for the wrapping of miscellaneous objects.

Then came the idea of plasticizing paper with either wax or water. An old newspaper was soaked in water and used to wrap a glass bottle. The wrapping properties improved tremendously and the wrapper possessed high shock resistance. Next a sheet of absorbent tissue was saturated with amorphous wax. The resultant wrapper was extremely pliable. Then came World War II with its "Moldable Ordnance Wrappers." Many new wrappings were developed and large quantities were used. At the close of the war, however, no one seemed to have developed test methods to measure or appraise either wrappability or moldability. To show actual technical progress in the improvement of engineering materials, test standards, based on specialized and scientific test methods, must be set up. To test is merely to begin to know. After a standard is established, technical progress may be measured by comparative tests. So it appeared that moldability tests warranted additional study.

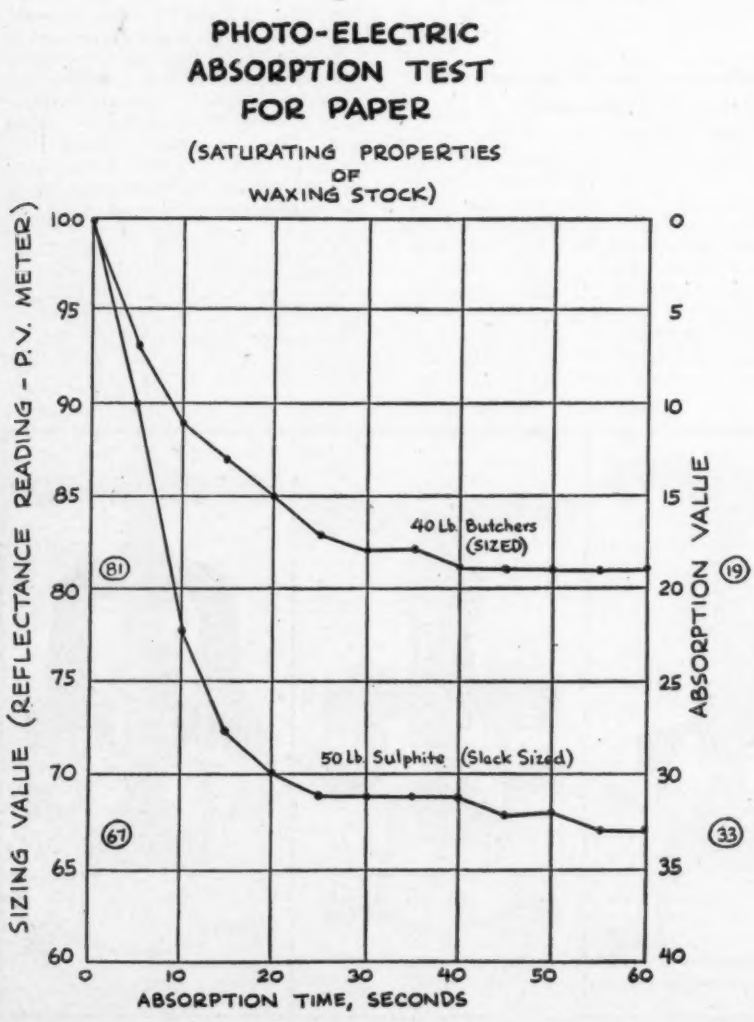
Next came a technical assignment to make paper as moldable as .004 inch aluminum 2 SO foil. How moldable was .004 foil? How moldable was paper? Could paper be made as moldable as foil?

To get the answers to these questions demanded a rather broad research investigation. This research project involved the following:

(1) Evaluation and selection of base papers; (2) compounding and selection of impregnants or plasticizers; (3) development of saturating equipment; (4) development of special test equipment to measure absorption properties of paper; (5) development of test equipment to measure moldability (cold-flow under pressure) and springback (resiliency) of foil, raw paper, experimental and production samples; (6) development of application equipment and final product tests.

Figure 1, captioned Photo-Electric Absorption Tests for Paper (Saturating Properties of Waxing Stock), shows the relative oil absorption rates of two different base papers; namely, a sized 40 lb. butcher's paper and a 50 lb. slack sized sulphite paper. The photo-electric absorption test was used to obtain both sizing (81 and 67 respectively) and absorption (19 and 33 respectively) values and to determine the probable rate of impregnation of plasticizers. To conduct the test, a standard Photo-Volt reflectance meter was used together with commercial Nujol as the standard impregnant. The paper sample

Fig. 1



*Presented at the Paper Converting Session of the Chicago Production Show and Conference, Stevens Hotel, Chicago, Illinois, March 20 to 22, 1946. Session sponsored by the Chicago Professional Paper Group.

for

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Appleton FELTS

APPLETON WOOLEN MILLS *APPLETON, WIS.*

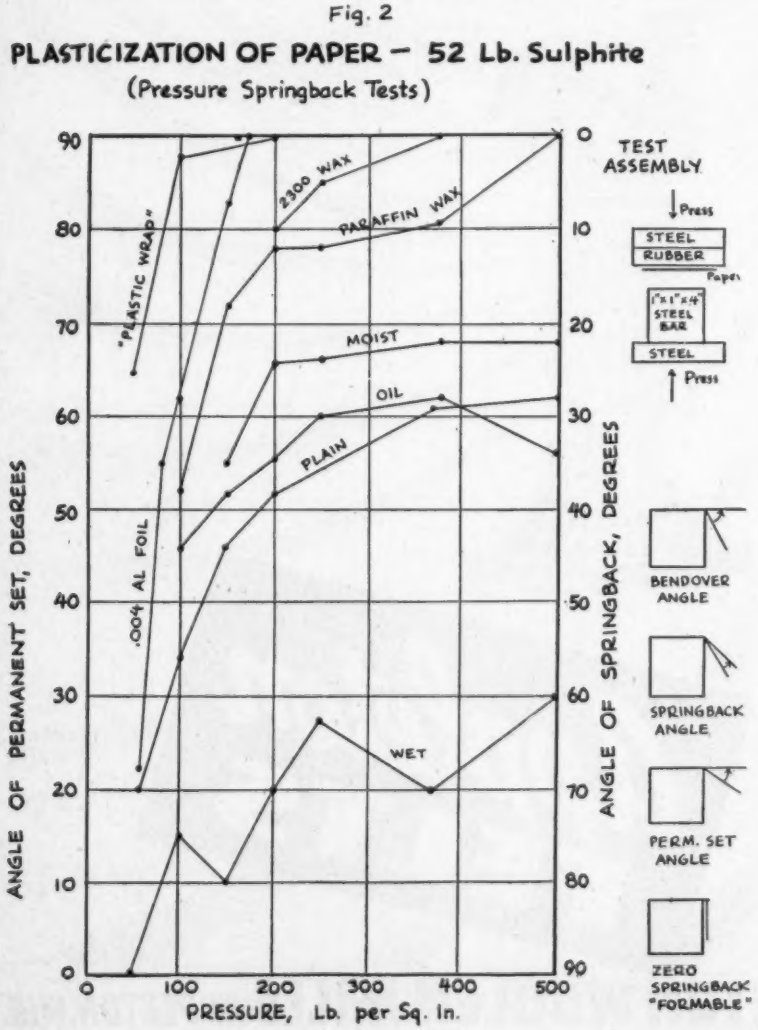
was placed over the top 1 inch hole of the inverted search unit composed of a light source and a photo-electric cell. The true reflectance reading of the paper was adjusted to 100 on the meter dial and then 5 drops of Nujol was placed on the top surface of the paper sample. Reflectance readings were taken at 5 second intervals on the bottom surface of the paper. The drop in the light reflectance on the bottom side of the paper was used to indicate the degree of saturation and to obtain definite sizing and absorption values for various papers. Since penetration through the sheet at the end of the 60 second test period seemed fairly complete, the reflectance values at 60 seconds were used to denote both the degree of sizing and comparative absorptiveness of the papers tested. Machine trials indicated that the photo-electric absorption test method possessed merit for the selection of special types of waxing or saturating stocks.

Figure 2, titled Plasticization of Paper —52 lb. Sulphite, shows the angles of permanent set and the pressure springback angles of plain (52 lb. sulphite) paper, wet paper, moist paper, oil saturated paper, paraffin wax treated paper, amorphous wax treated paper, .004 inch aluminum 2SO Foil (commercially pure), and a specially plasticized wrapper (Plastic-Wrap). The tests covered by this graph were made at room temperature using pressures ranging from 0 to 500 pounds per square inch. The permanent set and pressure springback tests were devised to determine the actual pressure in pounds per square inch required to effect a permanent 90 degree bend in the various untreated and treated 52 lb. sulphite paper. This paper normally had a standard springback of 30 degrees after the deadweight, 180 degree bend test used for appraising ordnance wrappers. The test is conducted by placing a 2 in. x 4 in. paper sample on top of a 1 in. x 1 in. x 4 in. steel mandrel and superimposing a piece of 1 in. x 4 in. x 4 in. pure gum rubber on top of the paper test specimen. The mandrel-paper-rubber test assembly is then placed between the upper and lower plates of a standard laboratory Carver hydraulic press. Pressure is applied and the degree of both temporary and permanent distortion of the paper is made by recording the bendover and permanent set angles at specific pressures. The test appears to have merit in that it indicates the pressure required to effect a permanent bend or "set" which seems to be related to the often-used term of "wrappability." Aluminum foil normally has a zero springback. The pressure exerted by the hands in wrapping a package or object can exceed 50 pounds per square inch. The chart indicates that the pressure characteristics of the "Plastic-Wrap" are better than those for the pure .004 in. aluminum foil. In other words, the paper, when fully and properly plasticized has better permanent set properties (0-200 pounds per square inch) than the foil. It is also interesting to note that the 2300 amorphous wax curve compares favorably with this general type of ordnance wrapper, and also excells the wrapping properties of paraffin waxed papers. By careful choice of plasticizer, one treated sample of the 52 lb. sulphite was produced which had pressure-forming characteristics almost identical with the .004 in. aluminum 2-SO foil.

Table 1—Order of Plasticity at 175 lb./sq. inch and 70 Fahr.

Type	Plasticity	Material	Kind	Plasticity No. (Estimated)
A	Very high (fluids)	Plasticizers	Light Oils Liquid Resins	100 100
B	High (semi-solids)	Petroleum Compounds, etc.	Petrolatum Soft Waxes Soft Resins	100 100 100
C	Medium (solids)	Waxed Tissue Aluminum Foil Lead Foil Aluminum Foil	Paper & Wax Thin; .0005; 2-SO .001 .0015 .002 .004	100 100 100 95 90 85 80
D	Low	Treated Paper	50 lb. Sulphite & Petrolatum 50 lb. Sulphite & Amorphous Wax 50 lb. Sulphite & Paraffin Wax	80 75 65
E	Very low (semi-stiff)	Paper Paper, Oiled Paper, Moist Paper, Plain	40 lb. Butcher 52 lb. Sulphite 52 lb. Sulphite 52 lb. Sulphite	35 50 50 40
F	Extremely low (stiff; brittle)	Resins, Hard Paper, Saturated	Staybellite No. 10 Paper & Hard Resin	0 0

Fig. 2



PREVENT SLIME and STOCK ACCUMULATION in Fourdrinier Wet Ends

CLEAN-UP TIME REDUCED. Installation of Monel head box linings also resulted in better machine operation for the Canadian mill where this photo was taken.

RELINING THE CYPRESS WOOD head box. Monel sheets were overlapped one inch at the edges, then fastened to the wood with *Anchorfast* Monel nails.

LOOKING IN on the finished job. These shiny, corrosion-resistant Monel surfaces will stay smooth . . . free from slime and stock accumulations.

CLEANING the head boxes on these machines was once a laborious job.

But not any more. The boxes have been relined . . . *and this time with Monel**.

Read what the Paper Machine Superintendent of this prominent Canadian mill now reports:

"Very little effort is needed on clean-up days to keep the Monel linings slick and clean . . . all that seems necessary is to wash the walls down with a fresh water hose."

That's just about all there is to it. And here's why.

Monel resists corrosion and pitting by paper stocks and white waters. The surfaces stay smooth, never give slime and fibre accumulations a chance to dig in and hang on. Clean-up days are always easy days, for acid cleaning and hand-scraping aren't necessary.

First used in this mill in 1944, Monel head box linings performed so satisfactorily that additional Monel linings were installed last year. As strong and tough as these shiny, corrosion-resistant linings are, installation was a simple job. Monel is readily bent, formed and shaped. It is easily cut and machined, and can be welded, soldered or brazed by commonly used methods.

A metal with Monel's characteristics has many uses in wet machines and in other types of pulp and paper mill equipment.

PRINCIPAL USES OF MONEL ON FOURDRINIER WET ENDS†

- Apron Plates
- Bolts & Other Fastenings
- Brace Rods
- Cross Braces
- Breast Rolls
- Dandy Rolls
- Distributor Rolls
- Doctor Blades & Backs
- Flow Boxes
- Flow Box Midfeathers
- Rails
- Rectifier Plates
- Remover Beams
- Remover Cross Drive Shaft
- Save-All Trays & Pans
- Shower Pipes & Nozzles
- Side Beams
- Slice Blades
- Suction Box Covers
- Suction Boxes
- Table Rolls
- Wire Return Rolls

†Under exposure to corrosive conditions generally encountered in Fourdrinier wet ends, Monel is safely used in combination with brass and copper parts.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

MONEL® NICKEL (INCO TRADE MARK) ALLOYS

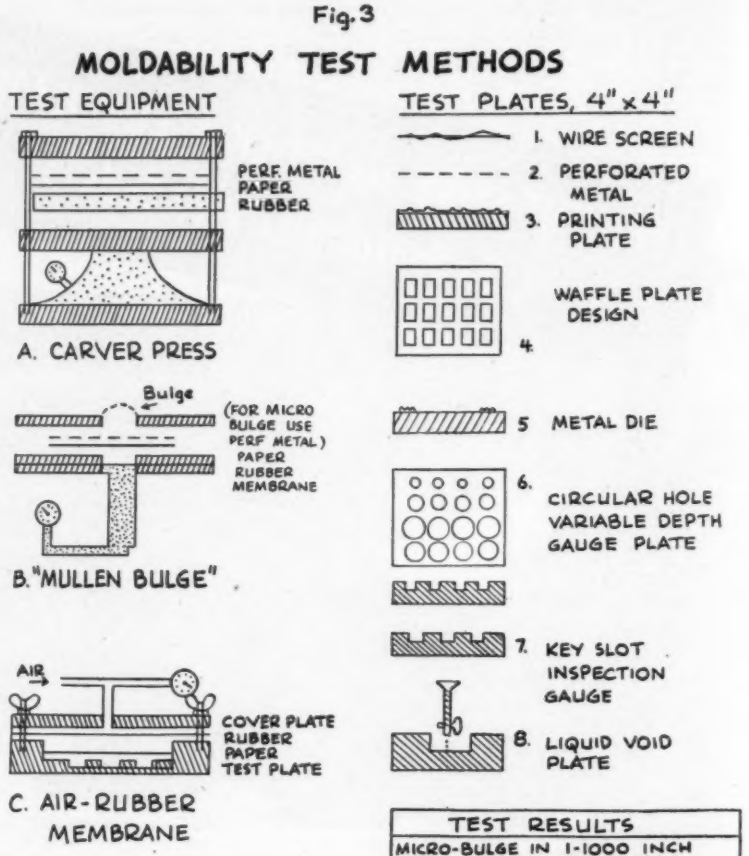
MONEL®· "K" MONEL®· "S" MONEL®· "R" MONEL®· "KR" MONEL®· INCONEL®· NICKEL · "L" NICKEL®· "Z" NICKEL®

*Reg. U.S. Pat. Off.

Figure 3, labeled Moldability Test Methods, shows sketches of three different types of test equipment, sketches of eight different test plates, and a table showing the results of a micro-bulge test at 410 pounds per square inch and 70 Fahr. The moldability tests were designed to either indicate or actually measure plastic or cold flow of wrappers under pressure at room temperature. Test plate no. 1, 2, 3, 4, 5, 6, and 7 together with the Carver press were used to evaluate papers for moldability by inspection only. The Mullen bursting strength tester may be used to obtain actual cold-flow-under-pressure moldability values of various sheet materials. The height of the bulge is the moldability value expressed in thousandths of an inch. Regular bulge values are taken at the pressure point just below the normal bursting strength of the material tested. The micro-bulge values are obtained by placing a piece of perforated metal on top of the paper test specimen, placing in the Mullen tester, applying a fixed pressure and measuring the height of cold flow in the metal openings via microscopic focusing technique (See Chamot and Mason; *Textbook of Microscopy*). It appears that the use of a calibrated liquid void plate together with an air-rubber membrane test device should yield improved scientific values for moldability of paper and other sheet materials. The calculation of moldability values using this latter device would be as follows:

Void Volume of Moldability Test Plate, Empty	11 cc.
Volume of Paper Test Specimen	1 cc.
Available Volume at Start of Test	10 cc.
Remaining Volume after Molding	9 cc.
Moldability	90%

Fig. 3



TEST RESULTS		
MICRO-BULGE IN 1-1000 INCH AT 410 LB. /IN² @ 70° F.		
NO.	MATERIAL	VALUE
1.	RUBBER-WAX	47
2.	.0012" AL FOIL	47
3.	.006" Pb FOIL	47
4.	.004" AL FOIL	23
5.	ORDNANCE WRAP	12

Table 2—Moldable Paper Products

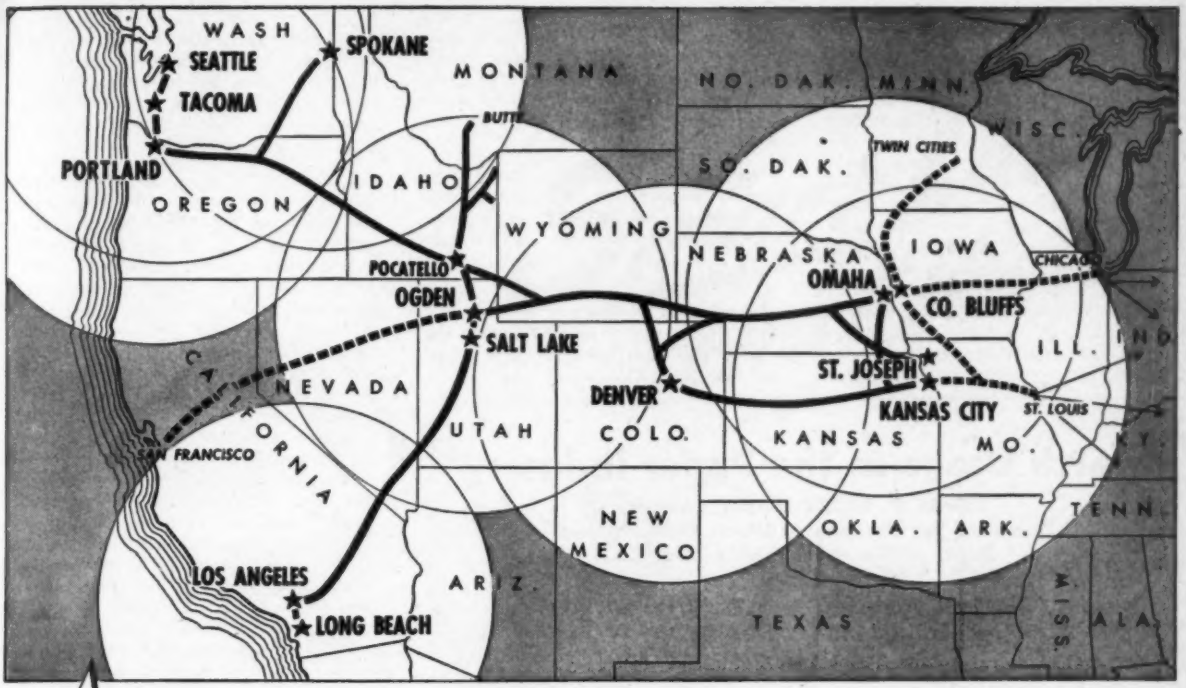
Type No.	Kind	Products
1	Pliable Hand Wraps	**Household** Food Wraps Sandwich Wraps Jar Covers **Industrial** Metal Wraps Package Wraps Special Wrapping Tissues
2	Pliable Machine Wraps	Food Wraps — Metal Wraps Meat Wraps — Package Wraps
3	Machine Molding Papers	**Heavy Duty Papers** Paper Plates — Egg Trays Paper Dishes — Cuspidors Paper Trays Cake Circles Pressure-Formed Packages (MOLDED PACKAGES) **Light Duty Papers** Doilies — Tray Covers
4	Die-Forming Papers	Tumbler Tops Disposable Ash Trays Coasters Closures
5	Pressure Sensitive Wraps	All types, e.g. food, sandwich
6	Fully Wraps Sealable	Frozen Food Food Bags Carton Innerliners Carton Overwrap Package Wraps
7	Multi-Ply Wraps	Food Wraps, etc.
8	Special Moldability Wraps	Adjusted Pliability Wraps for specific pressures and temperatures
9	Entirely New Products	Printing Mats Pressed paper products such as placques Embossed paper products

Table 1, entitled Order of Plasticity, shows the estimated plasticity numbers for liquid plasticizers, semi-solids, and solids such as paper, various thickness foils, waxed and impregnated paper, pure resins, etc.

Table 2, entitled Moldable Paper Products, indicates that there are at least 9 different kinds of paper products which are related to the general subject of moldability. One of the newer and more promising fields for new uses for paper appears to be the use of highly plasticized papers for straight line, machine packaging in which commercial items are placed between two moving belts of moldable paper. The moldable paper is formed around the part or product with two rubber faced press plates yielding finished packages similar to aspirin tablets. This technique is referred to in the table as "Pressure Formed Packages" or "Molded Packages."

Conclusions

1. This entire subject of plasticization of paper and moldability offers a promising field of new product development for the paper mill, the converter, the manufacturer, and the ultimate user of plastic paper products.



Opportunity for Industry

The western territory served by Union Pacific is rich in countless raw materials required by industry; has power and other necessary facilities; has a high type of native-born labor. Here lies the opportunity for industry to build and expand.

Among the principal industrial tracts owned or served by Union Pacific are those located in, or near by, the following cities:

Omaha, Neb.	Ogden, Utah
Council Bluffs, Iowa	Portland, Oregon
St. Joseph, Mo.	Seattle, Wash.
Kansas City, Mo.-Kans.	Tacoma, Wash.
(Fairfax District)	Spokane, Wash.
Denver, Colo.	Los Angeles, Cal.
Salt Lake City, Utah	Long Beach, Cal.

As the map shows, all these cities are located on the main lines of the Union Pacific Railroad.

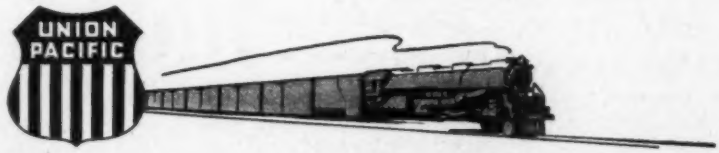
The circles on the map indicate 500-mile distribution areas. In normal times, Union Pacific operates a fast, merchandise freight (L. C. L.) service within these short-haul areas, with door-to-door pick up and delivery service.

These industrial properties are improved and occupied by many diversified manufacturing and commercial enterprises.

Necessary utilities are available and each tract is served by adequate industrial trackage. Whenever required, additional trackage can be provided.

You are cordially invited to write W. H. HULSIZER, General Manager of Properties, Union Pacific Railroad, Omaha 2, Nebraska, regarding industrial districts in territory served by Union Pacific.

be Specific – say "Union Pacific"



The Progressive

UNION PACIFIC RAILROAD

The Strategic Middle Route

2. There is a definite need for additional research on plasticized papers. The number of new products is limited only by the amount of consistent research by either individuals or firms. This subject seems to deserve more thought on the part of a larger number of paper technologists, and incidentally raises the question as to what will the general public or the industrial user pay for fully moldable paper products such as wrapping materials for miscellaneous end uses.

3. It appears that the technologists of the paper industry should co-operatively devise and adopt improved standard test methods for determining the saturating properties and moldability values of paper.

4. The plastic industry can be of great assistance to the paper industry by developing a low cost plastic impregnant for paper which will impart better plastic properties to paper than waxes or wax mixtures.

Author's Note: The term "moldability" used in this paper implies a combination of cold-flow-under pressure and permanent set or "stay-putness." No extensive study was made as to the relation of stretch to moldability.

Editor's Note: In addition to the above text, tables, and charts, numerous samples of moldable products were shown and discussed by the author.

Starch Usage in the Paper Industry*

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Technical Service and Products Development
Dept. of the A. E. Staley Mfg. Co.

This paper traces some of the past trends in starch usage leading up to its present status in the paper industry, and attempts to predict along what lines future developments will take place.

Importance of Starch

The paper and pulp industry ranks second among the industries of this country in the consumption of chemical raw materials with nearly one hundred different chemicals being used in appreciable quantities. Starch products rank high among the ten leading chemicals since only the chemicals used in pulping and alum, clay and silicate are used in greater tonnage. In 1943 alone, close to 300,000,000 pounds of corn starch products were consumed by the paper and paperboard industry. This is over 22% of the corn starch produced in this country, and makes the paper industry one of the biggest customers of the corn industries. Together with this consumption of corn starch, smaller amounts of potato, tapioca and other starches were used.

The large tonnage of starch consumed by the paper industry has been made possible through the remarkable versatility of this raw material which permits its use in many different points in the papermaking process. Among the principal uses are as a size for addition at the beater, tub, or calenders, and its use in the converting plants as a coating adhesive for coated papers, and as a laminating adhesive for solid fiber and corrugated board. Other converting plants use starch on a large scale as an adhesive for sheet lining, tube winding, bag pasting, case and carton sealing, in set-up box manufacture, and as a gumming adhesive for gummed papers and tapes. Corn syrup, which is made from starch, is also important as a plasticizer for papers, coatings and adhesives. In addition to these large tonnage applications, there are many novel uses which consume small quantities of starch. One of these is in the pulp mill where it is used as a settling agent in the clarification of kraft black liquor, and another is in the printing shop where it is used as a spray for the prevention of offset on printed papers.

The present trend is toward the use of starch in even greater quantities. It is not only gradually gaining in usage in the old established papermaking operations but has realized an almost overnight expansion as a result of some of the new developments, such as machine coated papers and starch-combined shipping containers. Recent advances in knowledge of starch chemistry promise new technical developments leading to a still wider application in the future. Most paper mill men are aware of these trends and are more mindful of the usefulness of starch today than they have ever been in the past.

History of Development

Starch was probably the first sizing agent used in paper, having been used by the Chinese as early as 312 A.D. In the early history of papermaking, the Arabs used uncooked starch as a filler to give a more substantial feel to the paper. There is also good evidence that cooked starch was applied as a surface size by these early papermakers. In the fourteenth century, animal size pretty much displaced starch in the size tub, and it was not until modern times that starch reappeared as a serious competitor. This reappearance of starch was because of the development of the modified starches, which was made possible through our modern knowledge of starch chemistry. Since that time starch has gradually replaced animal glue in the size tubs, except for some of the more specialized grades of paper, and there a combination of animal glue and starch is frequently used.

Coated paper as it is known today probably did not appear until the eighteenth century, when there are records of its having been made in England. Animal glue was the preferred size in those early days, and it was not until about 1890 that casein was used in this country. Casein has maintained a dominant position in this field ever since, and has never been seriously challenged by starch until the present day.

Laminating adhesives made from starch were known as early as 3500 B.C., when the Egyptians used them for cementing together strips of papyrus. Eighteenth century card makers prepared an adhesive by boiling a mixture of starch and flour and forcing it through a hair sieve. The use of caustic for preparing cold starch glues became important in the early part of the nineteenth century and somewhat later the discovery of borax-starch glues was made. As early as 1899, a patent was taken out in this country on the use of uncooked starch pastes for corrugated board manufacture whereby the starch is gelatinized after it is applied to the board and heated in the dryers. In the meantime, however, low cost silicate of soda captured the solid fiber laminated and corrugated box field, and it was not until the last decade when new developments in cooked starch glues for solid fiber and uncooked starch suspensions for corrugated board brought about a rapid replacement of silicate. Fortunately, these developments came in time to make possible the weatherproof shipping container which filled such an important place in World War II.

Although starch was the first sizing and gluing agent used in the early paper industry, it should be emphasized that modern starch usage involving many forms of modified starch dates from fairly recent times. Despite the early knowledge of starch manufacture and its usefulness in such industries as the textile and paper industries, starch did not become of industrial importance until the middle of the nineteenth century, and dextrin manufacture was not practiced in this country until later in that century. At about this time corn began to replace wheat as the principal commercial source of starch in the United States.

In the first part of the twentieth century, an important development took place in the perfection of the oxidized or chlorinated starches, commonly called starch gum at that time. This gave the paper industry a new starch product whose high strength and excellent colloidal properties made it very effective as a beater or tub size, and for the first time, provided effective competition for casein in the coating industry.

A more recent development has been the use of enzymes for converting starch in the paper mill. Within the last two decades several manufacturers made available to the paper industry a source of inexpensive commercial enzymes that were suitable for the modification of starch. At first these enzymes were considerably more effective for the conversion of tapioca than for corn starch, but recent developments have made available vastly improved enzymes for the modification of corn starch. To assist in this development, the starch companies have improved corn starch for conversion by enzyme.

*Presented at a meeting of the Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry, Nov. 1, 1945.

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Economics

Starch is widely distributed throughout the world in many forms of growing plants. This wide distribution of starch and the ease with which it can be extracted in a state of high purity from most plants makes it one of the most available of raw materials. In America, the corn plant, *Zea mays*, supplies by far the biggest share of the industrial starch. Normally, about 98% of the starch production in the United States is accounted for by the wet-milling of corn. The tremendous acreage planted to corn in the "Corn Belt" of the middle western states guarantees a stable source of supply, since in an average year only about 5% of the yearly corn crop is demanded by the nation's starch plants. Many of the states in the "Corn Belt" will average a yield of nearly 40 bushels of shelled corn to the acre and from each bushel 33 pounds of corn starch can be extracted. When it is realized that nearly 100,000,000 acres are annually planted in corn, it can be seen that the amount of corn grown is tremendous. The introduction of new corn hybrids within recent years has made it possible to increase the average yield and quality of corn.

The fact that the amount of corn which is refined into starch by the wet-milling industry is less than 5% of the total corn crop in this country has its disadvantages. This makes it almost impossible to promote the growing of specific varieties of corn for their starch content. On the other hand, this large reservoir of raw material has made it possible for the corn industries to maintain a uniform supply of corn starch even during the difficult war years when many unusual demands had to be met.

Starch has been competing for years in the paper industry with other adhesives, such as animal glue, casein, cereal flours, rubber latex, vegetable gums, and others. Compared to these other natural products, starch has been able to maintain a greater uniformity of quality and supply during the past years. In the future, a new type of competition will appear in the synthetics. Already the water soluble cellulose compounds, although not true synthetics, the water soluble polyvinyl compounds, and the urea and melamine formaldehyde polymers have appeared. Recent advances in the technology of making and using emulsions have made it possible to utilize water insoluble compounds in a comparatively cheap and effective manner. So far, however, these materials have been far too expensive for the usual paper mill operation, and there is little likelihood that they will ever be as cheap as starch. In some cases these products may be utilized in combination with starch to the advantage of both products. This has already happened in the case of the urea and melamine formaldehyde resins.

In the years before World War II there was considerable competition between corn and tapioca starch, although corn starch held a dominant position in this country, tapioca being sold principally on the basis of its lower cost. After the war this situation may not be so serious, as many of the East Indian mannioc plantations have been neglected, and the plants allowed to deteriorate. This fact and the likelihood that wage standards will rise in the Far East may make the growing of tapioca for consumption in the United States less attractive. The business of importing and dealing in tapioca is speculative, causing wide fluctuations in its selling price in this country, whereas corn, being free of the same economic factors, has been able to maintain a comparatively uniform price schedule. The uncertain economic and political factors involved make it difficult to predict the future of tapioca starch, but it is reasonably certain that the development of new types of glutinous starches in this country will make it unnecessary to import tapioca for those few special uses where it has been considered essential. There will undoubtedly be some competition between domestic starches such as potato, sweet potato, wheat, and glutinous corn and sorghum. However, regular corn starch has economic advantages over these other types which assures it of a dominant position for many years.

The most important economic factor in favor of starch is its low price. Selling for an average price during the past ten years for slightly less than 3.0 cents per pound, it is cheaper than some pulps and most grades of paper. This favorable balance often means that the cost of the starch is more than offset by the cost of the fiber it replaces, making a bonus of the favorable effects it creates in the paper. Realistic accounting methods should be applied in determining starch costs. For beater starch it is obvious that the cost of the starch should be compared to the cost of the pulp and consideration given to the factors of retention and white water loss.

A different situation exists in tub sizing; here it is logical to compare the cost of the starch size, not with the cost of the pulp, but with the cost of the paper at the size press. Applied in this manner, there is no starch loss and in view of the more favorable comparison in cost, it is usually found that the starch is cheaper than the paper, and results in some saving in cost.

It has been stated by one mill accountant that starch added at the size press is an actual saving to the mill where the pulp cost is more than 60 dollars per ton. This favorable comparison also exists for machine coated papers since the mineral pigment and starch binder has a much lower cost per ton than the fiber furnish, and its preparation and delivery to the machine in the form of coating color costs less than an equal tonnage of paper. This condition is true for paper which is sold on a weight basis, but obviously not true for board which is sold at a stipulated price depending on the caliper and square feet of surface.

It is, of course, possible to make a lighter board of the same caliper by "bulking," but this sacrifices some of the strength and bending qualities of the board. Thus, whereas machine coating is an actual saving to manufacturers of fourdrinier papers, its total cost must be carried by the board mills where there can be no appreciable saving in bodystock material. In many cases it will be necessary to produce a smoother, better-formed, and brighter surface on the board if a satisfactory job of machine coating is to be done. All of this naturally adds to the cost. It has been estimated (1) that the additional cost of machine coating to a board mill will be around 5 dollars per ton. The advantages of the coated product should be worth the additional cost to the customer using the product. It is the low relative cost of starch that is one of the big factors making it so attractive to use in the paper mill.

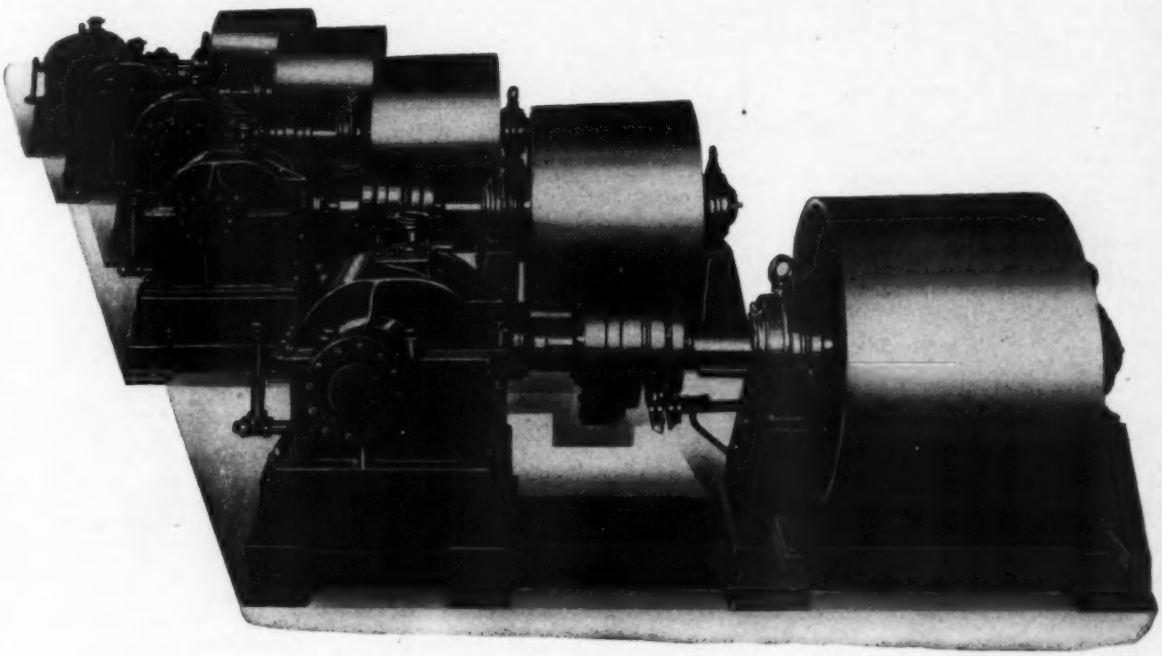
Aside from its advantages of low price, high quality, and stability of supply, starch is an extremely versatile material and is available today in many forms which make it suitable for its multiple uses in the paper industry. The native product is readily modified by treatment with heat, acids, alkalies, oxidizing agents, enzymes, and other special chemicals to give products of different chemicals and physical properties. Recent advances in starch chemistry promise new discoveries which will increase the usefulness of starch. Starch companies can be counted upon to promote these new discoveries, since the industry is a progressive one and maintains large laboratories with extensive research facilities. The paper industry is an important customer, and much research work is directed toward the improvement of starch products for paper mill use.

THE FUTURE USE OF STARCH

Starch usage in the paper industry should increase. This has been the trend over a period of many years, and there is every reason to believe that it will continue. However, changes in types of starch demanded and the methods of application will undoubtedly take place.

Beater Starch

Beater sizing has been for many years the chief method of applying starch, but in late years there has been a trend toward taking starch out of the beaters and adding it at the size press. This movement became popular because starch is usually more efficient when applied at the size press where there is no white water loss like that sustained in beater sizing. Although the beater is the easiest place to add starch, it is also the most wasteful, and mill men resist the use of high priced beater starch. This idea is not always sound, since the use in the beater of the relatively expensive oxidized starches is warranted in some cases for attaining certain special effects which cannot be attained with the cheaper starches. The development of a pregelatinized starch which is effective, but cheap, could result in the use of more beater starch. Because such a starch does not require cooking before addition to the beater, handling expense can be reduced. Pregelatinized starches have been available for years, but their use has been limited, because of high cost and low efficiency. During the war, many paper mills tried the use of special cereal flours for beater sizing. These flours are usually quite cheap, but in most cases they proved unsatisfactory, due to the creation



Bagley & Sewall NEW ASSEMBLED DRIVES

A Spiral Bevel Gear Unit, Magnetic Clutch and Cone Pulley, as illustrated above, is only one of several different variations of Bagley and Sewall Floor Drives as assembled of standard stock parts. Depending upon speed, ratio and power requirements of each application, the units may be composed by using Hypoid Gears or Worm Gears instead of Spiral Bevel Gears; also, the clutch may be of any type Friction Disc, Magnetic or Airflex. Instead of a cone pulley other types of variable or fixed speed methods may be employed.

BAGLEY B&S SEWALL

THE BAGLEY & SEWALL COMPANY

Builders of Paper Making Machines

WATERTOWN, NEW YORK

of a bad bacteriological condition in the mill system and the formation of specks in the paper, both of these difficulties arising from the 5 to 15% protein which is undispersible under ordinary conditions.

The practice of using starch as an internal size for paper is an ancient one. It has been used through the years for various reasons, e.g., to increase burst, tensile, or fold test; to increase stiffness; to increase the rattle; to improve sizing; to lay surface fuzz and improve the finish.

The recent rosin limitation order greatly increased the demand for beater starches since certain types, notably the oxidized starches, are usually quite effective in improving the sizing. Although the starch itself does not contribute to the sizing it acts as a protective colloid on the rosin, causing it to be precipitated in a more effective form. Many mills found that by shifting from a raw corn starch to an oxidized starch it was possible to maintain a good sizing test even though their rosin was reduced.

Surface Sizing

Surface sizing with starch has increased greatly in recent years. It has become accepted practice on most writing papers, bonds, ledgers, and boards where a smooth, fuzz-free, scuff-resistant finish is necessary for a good writing or printing surface. The amount of paper and paperboard surface sized with starch has increased greatly in recent years, and this method of starch usage will increase further as the public demands better writing and printing surfaces for its paper products. The highest grades of papers are now being tub sized with starch. Considerable animal glue is still being used, but much of this is used in combination with starch. Wetsoak paper is often made with 25 to 50% of the glue replaced with starch to prevent excessive hardening of the wet glue and to make repulping of the broke much easier.

In those mills where the amount of starch used is expected to reach large tonnage figures, consideration should be given to more efficient methods of handling and storage to eliminate excessive handling costs. The best type of cooking and storage tank is a debatable point. Wood tanks are generally used at present, but they are somewhat difficult to maintain in an aseptic condition, since putrefactive organisms, once allowed to form, tend to lodge in the cracks and pores of the wood. Iron tanks have been used, but have the disadvantage of corroding and causing discoloration of the starch, unless kept in constant use. Noncorrosive metals have received considerable attention in recent years, but it has been reported that copper equipment is detrimental to enzyme activity and should not be used without further study in mills which are planning to do their own converting; stainless steel equipment is, of course, quite expensive, and the expense may not be justified in most paper mills.

The old fashioned size tub, where the sheet is dipped into the size is gradually being replaced by the size press. It is difficult to thread a sheet through a tub at high speed and the tub itself was the cause of much grief because of the accumulation of foam, scum, and dirt specks. Nevertheless, the size tub is still being used in most of the mills making the highest grades of paper because it permits a greater pickup of size than the other methods of surface sizing. However, many of the mills have replaced their tubs with size presses and others, who have never tub sized, are planning on installations of size presses when they are available. A size press is easier to operate than a tub and the amount of pick-up can be regulated by the hardness of the rubber roll or by the pressure applied. In a size tub it is relatively easy to apply a uniform starch film since the sheet is immersed in the starch solution for an appreciable interval of time. This is not the case in a size press and it is necessary to keep the press rolls in good condition to maintain a uniform pick-up of size across the width of the sheet.

Oxidized starches have been used effectively for many years in tub sizing In recent years there has been a remarkable increase in the amount of enzyme converted starch used. This has been principally for reasons of economy, although technologists of the enzyme and starch industries have perfected their products to such an extent that excellent tub sizes can be prepared from enzyme converted starches. However, even today, many mills making high-grade papers have found that oxidized starches produce results that cannot be obtained with any other type of starch. This is particularly true in the matter of ink resistance. On some grades of paper ordinary starch size has little or no effect, whereas oxidized starch under the same conditions results in a 10 to 50% increase in sizing value. In rare cases some of the poorer starch sizes may actually result in a slight loss of ink or water resistance, although this can usually be overcome by lowering the temperature of the size. Consequently, until something better is discovered, oxidized starch should always be used for tub sizing where the best in results is desired.

During the war many mills found that the degree of sizing in their sheet had not decreased although they were forced to make substantial reductions in their rosin size. Later on the reason for this became apparent when they found that their slack-sized sheet was picking up more starch in the size press. They were simply doing the job with starch that they had been doing with rosin. It is likely that some mills will continue this practice after rosin is again available because of its advantages, among which are the higher strength, lower acidity, and greater weight of the paper.

Tub sizing with starch is also used for increasing the strength of the sheet. Highly converted starches should be used at high temperature for this purpose to increase the size pick-up and result in maximum penetration. Where improved surface characteristics are desired, a medium viscosity starch is indicated to keep as much as possible on the surface of the sheet.

Calender sizing with starch can be expected to increase in the future as more attractive cartons and shipping cases are demanded for display purposes. The use of starch size at high solids to apply a thick surface film is increasing. This not only improves the scuff resistance of the board, but improves the surface for gloss ink printing by preventing excessive penetration of ink. Often the saving in the printing ink which can be realized, more than pays for the cost of applying the starch at the calenders.

The use of corn syrup as a plasticizer increased greatly during the war as a result of the temporary shortage of glycerine. Many mills found that they could replace a high percentage of the glycerine in their plasticizing solution and actually increase its effectiveness, at the same time reducing its cost. The development of a new type of corn syrup of lower viscosity and greater plasticizing power has been an important factor. The expected demand for new flexible paper wrappings, paper drapes, and other paper specialties, as well as the familiar glassine papers, is expected to create a permanent demand for corn syrup as a plasticizer.

Coated Papers

After the war there will undoubtedly be a tremendous increase in the production of coated papers and paperboards. Printers and publishers will demand cheap, light weight papers that have good printability and appearance. Even low priced printing papers will be coated in the future. There is some interest in the coating of newsprint although an oil absorbent coating must first be developed. Most of the tonnage of these new papers will be coated on the paper machine.

This field of machine coated papers promises a greatly expanded use of paper coating adhesives and the future market will undoubtedly be a highly competitive one. Of all the coating adhesives under consideration, starch has received the greatest attention and appears to offer the greatest promise, because of its good working qualities and low cost. Printers have offered some criticism of starch coated papers made by machine coating processes. Some of this criticism can be traced to prejudice against starch coated papers which was built up among the printers in the early days when starch was first introduced and the wrong types were used. Furthermore, all the criticism which the printer has against the present machine coated sheet should not be laid to the starch adhesive. For one thing, the cheaper pigments are generally used in these papers and the present state of the art does not always permit perfect application of the coating. The use of better pigment formulation, better coating technique, and improvement in the surface of the bodystock, perhaps by means of breaker stacks before the coater, will improve machine coated papers from the standpoint of appearance and printability.

Another factor in this picture is the relative inexperience of paper machine crews in coating techniques. As their

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skill in handling coating color increases, a better job will be done.

Inexperience in the handling of starch is a factor with the conventional coaters who have tried starch as a replacement for casein. Most operators in these plants have had a lifelong experience with casein and know almost instinctively how to make minor machine adjustments to compensate for any irregularities in the casein or coating color. Starch is entirely new to most of these men and presents different problems which require time before they become as familiar as those with casein. However, as experience in the handling of starch is gained, most of these problems will easly be handled or disappear altogether. Many old-time coating plant operators have found starch the easiest adhesive to handle.

Some of the large paper mills, planning on a big expansion of machine coated papers when the war is over, have shown considerable interest in the shipping of starch in bulk. This is a logical development for these mills since they are already handling bulk clay. Unfortunately there are certain characteristics inherent in starch which make this method of handling more difficult than with clay. The main difficulty is the explosiveness of starch dust which, at the right concentration of dust and air, can be ignited and exploded by a spark. This condition is not peculiar to starch since most inflammable dusts, even paper dust, are explosive under the right conditions, but starch rates among the more highly explosive dusts. Experience has taught the starch companies much about dust explosions, and the U. S. Bureau of Mines has studied them for years with the result that it is possible to keep them under control by taking special precautions, such as frequent mopping of the floors and walls and use of spark-proof machinery.

Another difficulty is that bulk starch will not ship well in box cars because of a tendency to shift in the car and to sift through even the smallest cracks in the floor or walls. Clay manufacturers are thinking along the line of using special covered cars for shipping bulk clay, and it may be that the same cars could be used interchangeably for bulk starch. Since special cars and special unloading equipment will probably be necessary if starch is ever to be shipped in bulk, it will be impracticable for any but the large paper companies who will use starch in exceptionally large quantities.

The coating of paperboard is expected to keep pace with the developments in paper coating. Wallboard for interior insulation and soundproofing is being made today by machine coating techniques whereby a pigmented coating containing starch as the binder is applied to the board. The technical problems involved are somewhat more complicated than those in paper coating because of the comparatively rough surface of the board. Boxboard manufacturers are also seriously considering the machine coating of their product. Water-resistant starch coatings are desired for both of these products.

Adhesives

Another field in which the use of starch has expanded greatly in recent years is the adhesive field for solid fiber and corrugated shipping containers. Wartime demands for the weatherproof V-box have been responsible for most of this expansion, but some of this business may develop in peacetime, since a water-resistant shipping case has greater utility than one which falls apart when wet. There will be no necsesity in most cases to meet the severe requirements set up for the wartime shipping case which should permit a simplification and cheapening of the present water-proof formulas. Altogether, there should be a considerable increase in the usage of starch adhesives in the boxboard industry. This is particularly true for the corrugated board industry where many of the plants will be converted to starch usage. In many cases this will mean equipping present machines with additional heating facilities to properly utilize the starch adhesive, particularly as the mills go to higher speeds and higher caliper boards. In the solid fiberboard industry much was learned during World War II about the proper handling of starch adhesives which will be of considerable help to post-war users. The proper adjustment of machine conditions such as paste roll crown, roll smoothness, and pressure applied is of tremendous importance in attaining a good spread figure and a reasonable combining cost.

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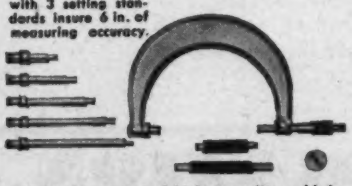

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Starch Quality

Future developments in any industry are difficult to predict with accuracy. In general, quality standards can be expected to improve with time. This has been true in the starch industry and starches which were perfectly acceptable ten years ago would not pass our present standards for color and purity, although starch has always maintained standards of quality equal to, and for the most part better than, those of the other raw materials for paper manufacture. The quality consciousness of the postwar consumer and the anticipated increase in starch usage for such an exacting purpose as paper coating may impose higher standards of purity and uniformity than were required in the past. It is questionable, however, whether a product like starch which ordinarily contains less than 1% of non-starch constituents will ever need much improvement for industrial use. The current high grade starches contain only microscopic amounts of such impurities as protein, ether extractables, and ash, none of which cause any difficulty in paper usage and are perfectly acceptable in our present day starches.

Chemistry of Starch

Considerable progress has been made in recent years in our understanding of the fundamental and applied chemistry of starch and, for the most part, paper chemists have kept themselves well informed on the subject. Even so, there are occasional cases where starch is misused, but these will become fewer as co-operation increases between the paper mill laboratories and the technical service laboratories of the starch industry.

Within recent years the majority of starch chemists have accepted the theory that most types of starch are composed of two distinct chemical constituents and have even devised a method for the separation and quantitative determination of each. This has made it possible to separate and determine the effectiveness of the individual constituents for each paper application independently of the other starch fraction, and also to study the effect of the various methods of starch modification on the properties and relative proportion of each constituent in the converted product. Although the subject is new, it is known that the two constituents have widely different chemical and physical properties, and each has its particular effect. In the present stage of development, it is too much to expect that starch be separated into its various constituents commercially and each sold separately, since none of the methods are applicable to large scale operation, but in the far distant future, it may come about.

Only the threshhold of understanding has been reached. As knowledge increases in the future, new developments of practical importance can be expected. The corn refining industries have invested heavily in industrial research programs, and have directed much of this effort toward the improvement of their products

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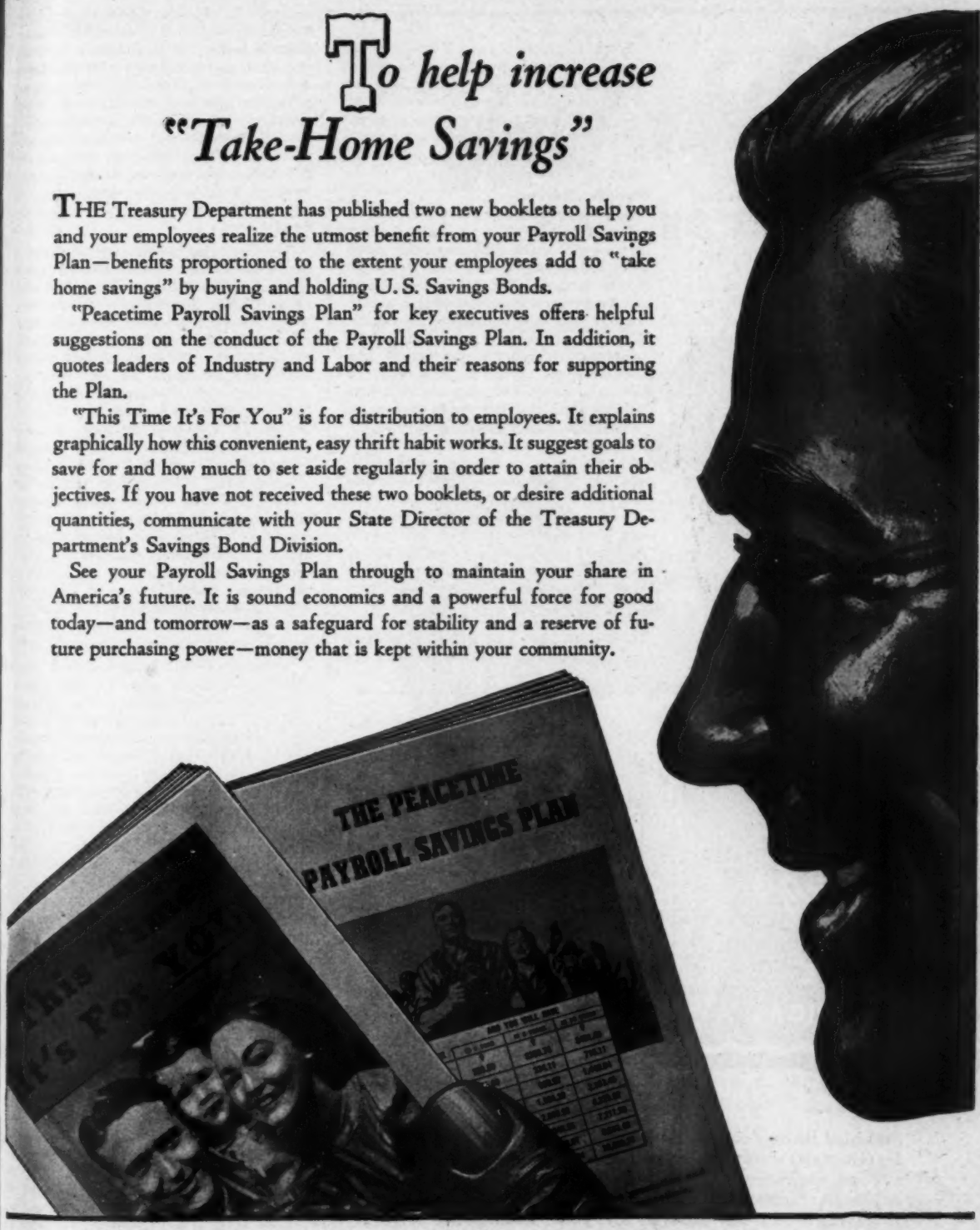

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Beater Starches

New technical developments can be expected in the old established methods of using starch as well as in the new processes. For example, even in such applications as beater sizing starch has been used for centuries, the principles underlying its usage have never been well understood. It is not uncommon to find a paper mill where the conditions of use are such that the starch functions as little more than a filler. Even though the starch is thoroughly cooked, it may not be in its most effective form. This is particularly true for unmodified or raw starch which even though cooked may not be more than 50% dispersed. Most paper mill chemists do not recognize the fact that in a cooked pearl starch up to 50% of the starch may be in the form of large swollen granules and not in the form of a colloidal solution. Starch in such a form cannot be as effective in a sheet of high density as a completely dispersed starch solution since it is not available to cover the fiber surface. This explains the increased efficiency in most grades of paper of oxidized starch, which disperses readily on cooking. However, oxidized starches have the disadvantage of relatively high cost and on certain colored papers of throwing off the shade. Laboratory tests have indicated that it is possible to attain results equal to those of oxidized starch by physically treating dispersions of raw starch to disperse the swollen granules.

Work is planned along these lines to obtain a more effective process of sizing with starch in the beater. Beater sizing is an important and worthwhile method of sizing and, when done properly, gives an improved formation and uniform strengthening of the sheet which cannot be obtained by surface sizing.

Glutinous Starches

Paper mill chemists have recently shown considerable interest in the new varieties of glutinous starch, inappropriately called waxy starch, which have been developed in this country. The U. S. Department of Agriculture, state agricultural experiment stations, and colleges in the Middle West have done much work on the development of glutinous varieties of corn and sorghum. Both of these products have been grown and processed on a commercial scale and the starch distributed in small lots. These glutinous starches, unlike any other variety, are composed of only one major constituent, amylopectin, and owe their unusual properties to this fact. In the native state, they are much like tapioca in the transparency, tackiness, and nongelling property of their pastes, but unlike tapioca, have the further advantage of retaining these properties to a marked degree after the starch has been converted by either acid or enzyme to make it thin boiling.

Although there is a strong resemblance between glutinous grain starch and the root starch, tapioca, this similarity is a superficial one, since they differ fundamentally in the fact that tapioca, like regular grain starch, contains a high percentage of amylose. Because of its unusual properties, glutinous starch would probably find applications in the paper industry if it could be produced cheaply enough. Although the raw material can be readily processed in standard equipment of the corn processors, there are several difficulties which will hold up its development.

The corn has a low yield, makes a poorer stock feed, and in addition must be grown away from ordinary varieties of corn, since the glutinous characteristic is recessive, and is lost if cross pollination takes place. Furthermore, it must be handled with unusual care in harvesting, shipment, and storage to see that it is not mixed with ordinary corn. This makes it an undesirable crop from the farmer's standpoint. To make it attractive as a crop in the corn producing states, it would be necessary to offer the farmer a higher price to offset his low yield and greater trouble, and this, together with the fact that the corn has a lower starch content, would be reflected in a higher price for the starch. In some ways, sorghum offers more promise as a source of glutinous starch, since it can be grown on the poorer lands of the Southern Great Plains, where it is useful in the prevention of wind erosion in the so-called "dust-bowl" area.

Varieties of glutinous sorghum have been grown in this area for many years, but recent developments in the hybridization of this crop have led to the development of dwarf grain varieties which are no taller than wheat, and which can be harvested by combine, making it a potential source of low cost grain. Although considerable promotional work has been done on the use of glutinous starches in the paper industry, the amount of starch available is small. In 1945 it is estimated that approximately 1,000,000 bushels of glutinous corn will be ground, and this is only a small fraction of the total corn ground in this country. Glutinous starches have particular advantages for certain food uses, and as a remoistening gum for envelopes and postage stamps. These are the uses for which high grade tapioca was required and the amount has been estimated at about 50 million lb. of starch per year.

There is also some interest in other types of starch, such as wheat, potato, rice, and sweet potato. Several large laboratories are working on the development of products from these raw materials, but the relatively small amounts that will be available and the higher price of these starches will limit their consumption to special users of small volume.

Coated Papers

The most promising field for the starch manufacturer for postwar development in the paper industry is paper coating. An indication of this is the large number of paper coating patents granted during the last five years. The Technical Association of the Pulp and Paper Industry has recognized this trend, and has made plans to

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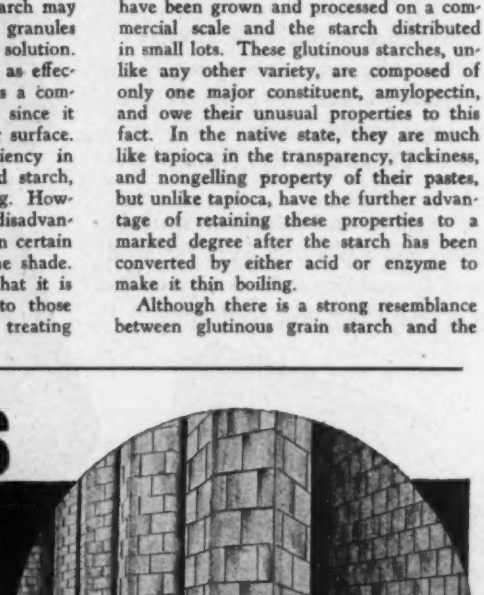

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publish the available technical information in a forthcoming monograph on paper coating, of which an important section is devoted to starch adhesives. At the present time, paper mill laboratories are investigating the various types of modified starches to determine the best type for coating work. In past years it was believed that only the oxidized starches could be used, since they were the only type possessing a natural dispersing action on the pigment and sufficient adhesive strength.

Since the use of the pyrophosphate and metaphosphate compounds for dispersing clay slurries has become common practice, it has been possible to utilize other types of starch. Those receiving the greatest attention at present are the oxidized starches, special dextrines, and enzyme converted starches. Improvement of starch as a paper coating adhesive is an active problem, since any improvement in starch that will result in a coating of greater strength, smoothness, oil attraction, water resistance, and of better color and printing qualities will be very worth-while to the paper coater.

Some of these properties can be improved by better formulation of the coating mix and better understanding of the characteristics of the various types of starch, all of which can be realized as soon as the paper coater becomes more experienced in handling starch. For some of the very highest grades of coated papers, it has been reported that starch coated sheets do not print as attractively as casein. This has been traced to a lack of homogeniety in starch dispersions resulting in a somewhat discontinuous printing surface, but it now looks as if this difficulty can be overcome by the use of more homogeneous dispersions. In this respect, starch has an advantage over casein, since it does not foam and form pinholes in the coated surface which is a frequent difficulty with casein, resulting in sheets of poor printing qualities.

Coating on the paper machine has created a great deal of interest in high solids coatings. Most machine coating processes can handle coating colors that would be far too heavy in body for the conventional roll or brush coating, and in addition, there are operating advantages to be realized from the use of high solids coatings for machine application, although in some cases these advantages have been overvalued. At the same time, the use of high solids coating colors and their application with high-speed operations have caused new problems in maintaining the proper flow properties in the coating color. New techniques have had to be developed to measure the viscosity, yield value, water retention, and other physical properties of a coating color which are highly important to machine coating operation.

Special starches may be necessary to reach the upper range of high solids coatings and still maintain the proper flow properties and work is underway to adapt all the major types of starch to that purpose. One enzyme manufacturer is working with the idea of converting starch with enzyme in the presence of the pig-

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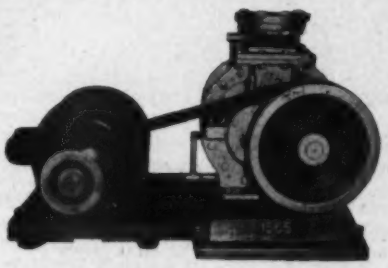

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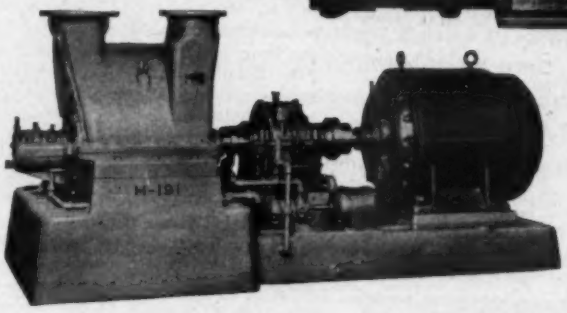

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Water Resistance

Within recent years the demand for water resistant pigment coated papers has been increasing. The volume of coated paper and paperboard requiring a high degree of water resistanee is small, but a slight amount of resistance to water is desirable for any paper to prevent smudging of the coating or two sheets sticking together when accidentally wet, such as when handled with damp hands. For such grades as machine coated boards to be water finished on the calendars and coated sheets for lithographic printing, it is almost a necessity.

Regular starch coated sheets, which are not even superficially water resistant, have been printed by the offset process, but this apparently requires special care on the part of the printer. An interesting fact pointed out by one paper coater is that casein coated sheets lacking in water resistance can never be printed by offset because of the strong emulsifying power of the casein which tends to break down the oil-water interface on the printing roll, while starch, being a weaker emulsifying agent, has little effect.

Casein will be used for some time on papers requiring a high degree of water resistance such as coated tags and labels, and for high strength coated sheets like those used for gloss inks and varnishes. However, starch will be a strong competitor for most of the standard grades of coated papers, since most coaters are willing to overlook its lack of water resistance because of the other good qualities. Furthermore, advances have been made in recent years in the development of water resistant starch coatings, and while the results have not been satisfactory in all cases, they have been encouraging, and work is continuing on them.

Water soluble urea formaldehyde resins have found considerable use as an agent for making starch water resistant. Considerable work was done during the early part of World War II on the development of waterproof starch glues for solid and corrugated fiber boxes for export shipments, and the results were highly successful. Attempts have been made to utilize this process in the preparation of water resistant coatings, and in some cases the results have been promising.

The process is difficult to adapt to paper coating work, however, due to the high percentage of pigment used with the starch which causes a lowering of the water resistance effect. Also, the presence of this clay makes it impossible to use strongly acidic coating mix for setting up the resin, since clay is flocculated at low *p*H. Because of this limitation and the impossibility of applying sufficient heat on the standard coating machines, it has been necessary to utilize a catalyst such as ammonium chloride for cold curing the resin and starch combination. Even so, it has been difficult to maintain a coating color of uniform viscosity when these resins are used, due to their thickening effect on the starch and the gradual development of acidity in the coating resulting from the reaction of the catalyst and resin.

To overcome this difficulty, batches must be made and used within a period of a few hours. Lack of plasticity or brittleness has been another cause of occasional difficulty with these starch-resin combinations, and it cannot be corrected by the usual remedy of adding water soluble plasticizers, such as glycerol or corn syrup, since they materially interfere with the development of satisfactory water resistance. Wax emulsions have been suggested as an agent for increasing the plasticity and water resistance of the coating. In spite of the above difficulties, it has been possible to prepare coatings with a fair amount of water resistance, using the urea formaldehyde resins available today. Unfortunately, the cost of the resin-starch combination is fairly high, but this may be reduced in the future as cheaper resins are made available.

Urea formaldehyde resins have also been used in starch tub size to improve those papers where a certain amount of wet strength and dimensionable stability is desirable. Papers to be used for photocopying by the diazotype process are ordinarily tub sized with a starch-urea formaldehyde size. These papers are developed by a semi-wet process whereby the alkaline developing solution is applied to the surface of the paper by means of a roller, thus making unnecessary the extreme water resistance required in blueprint papers which are fixed by washing.

Evidence has been obtained showing that not only does the resin improve the water resistance of the starch, but in some cases, that the starch actually increases the water resistance obtainable with the resin alone. The use of this combination will probably increase in the future, since it offers advantages on many grades ordinarily tube sized with starch. For example, it should be worthwhile as a tub size for uncoated offset sheets where a slight amount of water resistance would help to prevent "fluffing" of the surface fibers under the moist conditions of the offset printing process.

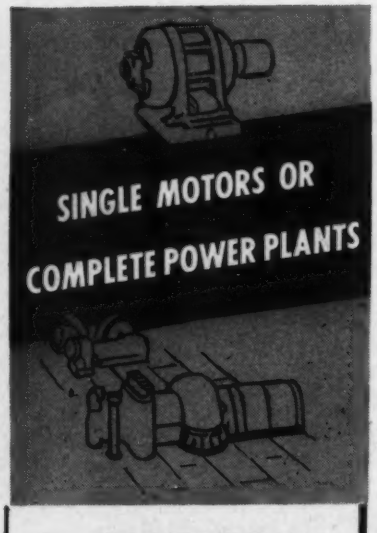
Of particular note has been the use of urea formaldehyde resins in starch adhesives for combining the weatherproof V-box of both solid fibre and corrugated design. This development has been of immense importance during World War II, and considerable work is in progress to simplify and cheapen the process for postwar use. In the field of liquid glues of the sealing type, manufacturers have turned their attention to the development of glues from starch and urea formaldehyde resin to replace the more expensive casein and resin emulsion glues. The combination of starch and synthetic resins is a tremendously important field and promises much of future importance as new resin products are developed. The possibilities lie not so much in the mere mixture of two products, but in those combinations like the starch-urea formaldehyde combination where there is an actual reaction between the two products resulting in a new substance of vastly improved properties.

Pregelatinized Starches

A promising development that may be forthcoming is a cheap, effective pregelatinized starch for beater application. The products in this category offered, before the war, were made by treating starch at high moisture content with heat or chemicals, to effect more or less complete gelatinization of the starch, and then drying and grinding the pasted product. A process such as this is expensive and results in a prepasted product, which is difficult to disperse and the relatively coarse particles produce "shiners" in the finished paper. With the newly developed product it is possible to obtain really complete dispersion of the granules in the paper eliminating the possibility of "shiners," and insuring good distribution of the starch throughout the stock. Mill tests on several different grades of paper have shown good strength increases with this starch and indications are that the product can be put on the market within a reasonable time.

Conclusion

Starch usage has been associated with the manufacture of paper from the earliest days of which there were reliable records. Since then it has increased to the point where it is used today in nearly every important step in the paper mill process. This remarkable expansion has been due in part to the great improvement in our agricultural economy, which has made starch bearing crops, notably corn, available in large quantities at a low cost, but perhaps a bigger factor has been the advances in our knowledge of starch chemistry, which has made it pos-



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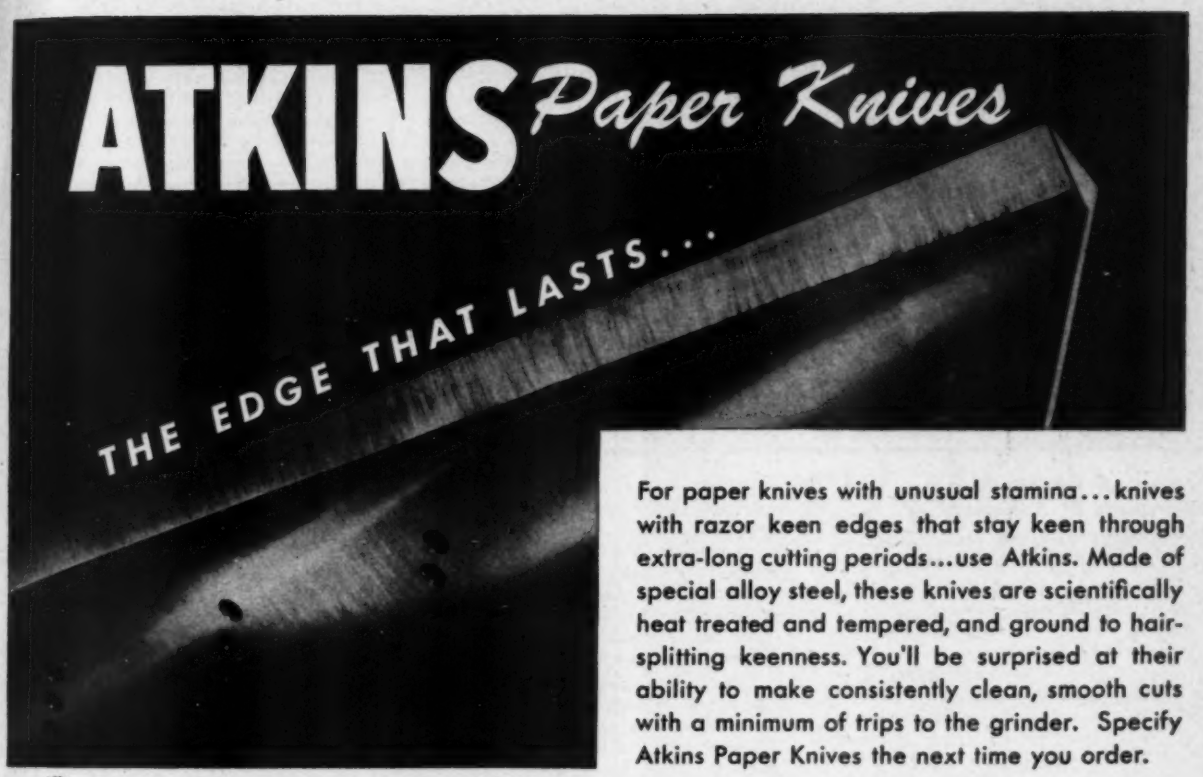

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sible to develop modified starches of greater utility. Rapid advances have been made in the last decade, and as our knowledge increases, new products and a wide use of these products can be expected.

Literature Cited

(1) Simpson, J. R., *Year Book and Program*, 25th edition, American Pulp and Paper Mill Superintendents Assn.

♦

Japan—Pulp and Paper Industry Survey*

Very little was known of the pulp and paper industry of Japan and her possessions — Korea, Manchuria and Karafuto (South Sakhalin Island) — in prewar years because of the inaccessibility of this type of information.

The General Headquarters of the Supreme Command of the Allies in the Pacific (SCAP) recently compiled data on the capacity and the present condition in the pulp and paper industry, which appeared of late in an English language newspaper in Japan. The information in this industry survey is the basis for this monograph.

It should be noted here that the exigencies of the collection of economic data by the military render this data subject to revision.

(*) This review from an English language Japanese newspaper has been released by the American Paper and Pulp Association with full credit to Arthur Chamberlain, executive secretary of the National Paper Trade Association.

PRINCIPAL PAPER COMPANIES

The largest paper manufacturer in Japan is the Oji Paper Company, whose production constitutes about 60 per cent of the present output. Because of the wide dispersal of its interests, only a partial compilation of its production can be given at the present time. This shows 17 mills and 71 machines in Japan proper with a present production capacity of 483,000 tons. Nineteen of the machines were damaged in air raids.

With the forfeiture of territories, 17 subsidiaries of the Oji Paper Company were lost. These mills had a total annual capacity of 325,000 tons, and included 9 in Karafuto (250,000 tons), 3 in Korea (35,000 tons) and 5 in Manchuria (40,000 tons).

The Mitsubushi Paper Mill Company has 3 mills, 16 machines (3 damaged) with an annual capacity of 57,500 tons.

The Hokuetsu Paper Mills Company has 5 mills, 9 machines with an annual capacity of 48,500 tons.

Japan Paper Industry Company has 3 mills, 14 machines with an annual capacity of 43,500 tons.

WOOD PULP MILLS

Production

Eighty-two wood pulp mills were reported in Japan during the war with an annual production of 754,000 tons, before air raid damage cut this production capacity by 101,160 tons. Three plants were listed as 90-100 per cent damaged in air attacks, and 2 as 10-49 per cent. No damage to any of the mills was so extensive as to require complete rebuilding.

Consumption

Of the total pulp consumption in 1942 of 1,257,577 tons, the Japanese Army used 102,267 tons (8 per cent); the Navy, 44,085 tons (4 per cent); and 200,335 tons (16 per cent) went for newsprint.

In 1944, total consumption amounted to 610,140 (about 50 per cent of 1942). Of this total, the Army consumed 138,169 tons (23 per cent); the Navy, 81,071 tons (13 per cent); and for newsprint purposes, 138,470 tons (23 per cent).

PAPER AND PAPERBOARD MILLS

Production

The number of paper mills in 1941 (before the war) was 467, with 782 machines and 32,000 laborers. As of October, 1945, this had been cut to 205 mills with 360 machines and 19,051 laborers. Forty-two mills suffered air raid damages, which were estimated at 23 per cent of the total production capacity. Planned production for the first quarter of 1945 had been about 100,000 tons compared with actual production of 64,000 tons.

Paper production capacity in 1941 was 1,620,000 tons, including 800,000 tons of "foreign" paper, 500,000 tons of board and 320,000 tons of "Japanese" paper. As of October 1945, this had been cut to 826,000 tons, including 432,000 tons of "foreign" paper, 224,500 tons of board and 169,500 tons of "Japanese" paper.

ANNUAL PRODUCTION—(Short Tons)

Prewar		*War Years*	
1935	1,132,168	1941	1,406,865
1936	1,214,029	1942	1,100,312
1937	1,435,793	1943	806,875
1938	1,264,366	1944	431,845
1939	1,449,836	1945	*256,000
1940	1,432,159		

(*) Estimated.

Production capacity in Japan as of October 1945 was 432,000 tons per year of "foreign style" paper, compared with 715,000 tons estimated as the total capacity after repairs and reconversion. Minimum requirements are estimated at 795,000 tons. Paperboard capacity was estimated at 225,000 tons, to be increased to 280,000 tons after repairs and reconversion. Minimum requirements are said to be 210,000 tons. Present capacity for "Japanese" paper was set at 213,000 tons, with no reconversion or repairs required. Minimum requirements for this grade of paper are said to be about 160,000 tons.

Consumption

The military accounted for 12 per cent of Japan's paper consumption in 1942, 24 per cent in 1943, and 36 per cent in 1944. No figures were given as to overall actual consumption.

Convention Papers . . . Abridged

Some of the Newer Concepts of Adhesion*

LAMBERT VAN ROY, Chief Chemist
Central Paper Company

The popular conception of an adhesive is not complete for it does not include and account for all the facts and borderline cases. Wax, for example, is often used as an adhesive in laminating paper, where a strong bond is not required. Even a film of water may cause two pieces of paper to adhere to each other, but water is never considered an adhesive. It does not cover the sizing of paper nor the drying oil in paints which causes the pigment particle to adhere to the surface covered and to each other; or the ability of inks to adhere to paper and other surfaces such as films and foils.

Just when adhesives were discovered or invented is a matter of speculation. It is, however, reasonable to assume that adhesives were made and used prior to the stone age. Cave drawings believed to be 20,000 to 30,000 years old have been found, and it has been ascertained that these pictures, which are bright in color, were made with paint in which animal glue was used as the vehicle. The Egyptians were the first to furnish us with proof that glue was a useful product more than 3,300 years ago. Stone carvings of that date illustrate the complete method of veneering. The Egyptians also used adhesives for preserving mummies. Pliny mentions the making of adhesives in his writings and even goes so far as to describe the best way of making vegetable adhesives in his time.

In spite of the fact that adhesives were discovered or invented before the stone age, progress has been very slow in the development of adhesives and adhesive products as we know them today. For example, it is less than 100 years ago that the first gummed postage stamp was put out by the United States, and up to 105 years ago wax was still the medium for sealing envelopes. Gummed paper tape, which is used in almost every business establishment in the country, is only about 35 years old.

Now, what makes an adhesive an adhesive, and why is there no such thing as a universal adhesive?

In order to understand thoroughly the function of adhesives from a scientific standpoint, we shall have to go deeper into the subject of atomic structure of both adhesive and adherent.

The atomic theory states that all matter is composed of particles or atoms which are held together by electrical forces of attraction. These particles or atoms have a positively charged nucleus and negatively charged particles which operate in orbital motion around the nucleus.

Matter which is made up of molecules which are symmetrical and have the center of electrical attractions coincident with the center of the mass of the molecules may be termed non-polar, while matter which is composed of molecules which have the center of its field of force center other than the center of its mass may be termed polar.

In methane we have a non-polar compound while methyl alcohol, because the center of the field of force is centered around the O H group, we have a strongly polar compound. Water is a strongly polar compound.

Hydrocarbons are of the nonpolar class.

Nonpolar solvents have excellent solving power for nonpolar solutes. The polar solvents have the property of dissolving polar substances.

Polar forces are stronger than nonpolar forces.

We find that we cannot make a strong bond with polar substances unless we use polar adhesives, nor can we make strong bonds with nonpolar substances unless we use nonpolar adhesives.

At this point it begins to appear that an adhesive is a substance in which the molecules have sufficient attraction for the adherent to cause a bond to be effected, and that is exactly what happens.

If a substance is used as an adhesive which has no attraction for the adherent, then no bond will be effected. The adhesive sort of gives the adherent "the cold shoulder." This may again be illustrated by the fact that there are certain liquids which refuse to let themselves be mixed with other liquids, such as oil and water.

On the basis of molecular attractions, we can explain why it is possible to make a bond between two surfaces that possess a tensile and shear strength which is many times the tensile and shear strength of the adhesive used. It has also been proved that the thinner the adhesive layer, up to a certain point of course, the stronger the bond will be.

McBain, who has done a tremendous amount of experimenting with adhesives and bonds, found that if the internal stress of a number of metals (which can be determined from the heat of vaporiza-

*Abridgment of paper presented at the Paper Converting Session of the Chicago Production Show and Conference, Stevens Hotel, Chicago, March 20 to 22, 1946. Session sponsored by the Chicago Professional Paper Group.

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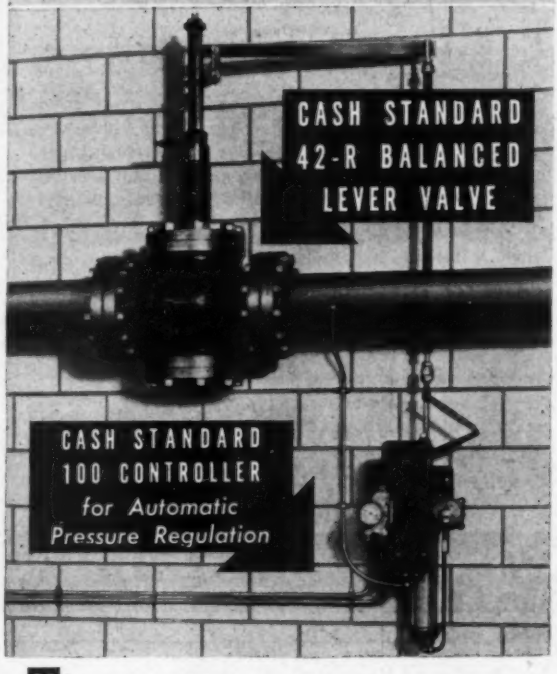

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tion) is plotted against the tensile strength of the bond which is formed when two pieces of the same metal are bonded that an approximately straight line is formed. In one case he obtained a bond which was eleven times the strength of the bonding medium used.

Thus we begin to see that it is possible to make a bond which will be stronger than the adhesive, but we can never make a bond which is stronger than the forces emanating from the adhesive and the adherent.

Thus far we have discussed molecular attractions and repulsion and have pointed out that molecular attraction is the cause of adhesion. This being true, then why do we bother with an adhesive at all? Why don't we just press the two objects which we wish to have bonded to each other together and make the bond? After all, if the two objects have the same chemical composition, we should not have any difficulty. If we can fulfill the requirements, we do not need an adhesive to bond objects to each other, but in many cases it is impossible to fulfill all the requirements.

Let us take a practical example. If we take a glass rod and cut it into two pieces we find that no matter what we do, we cannot make them stick together again, or, shall we say, we cannot get the molecules on each surface to align themselves in such fashion as to attract the molecules in to the other piece of glass. Now, if we heat the glass rod so that the molecules are to some extent free to move, we find that a lasting bond is readily effected.

A more convincing experiment can be performed by using steel instead of glass. When we try to get the two pieces of steel rods to stick together, we find that we are faced with the same difficulty as was the case with the glass rods. But, if we grind and polish the surfaces which we are trying to join together to a point where the irregularities would run into mills and then place the rods together with a little pressure and a twist of a few degrees, we find that the rods are impossible to separate without rupturing the surfaces joined.

Industrial Relations in the Waxed Paper Industry*

P. J. MASSEY
H. P. Smith Paper Company

Inflation during today's postwar period, as contrasted with the period following World War I is not reflected in a direct major increase in wholesale prices. There is a fair chance that wholesale prices of materials will not skyrocket. However, in our segment of industry, we have serious inflation of raw materials, which is mainly reflected in some higher pricing, but mainly in poorer quality and upgrading of raw materials.

Cost of living is officially reported as inflated by 29%. However, this does not take into consideration the shortage or entire disappearance of the low priced items we enjoyed; the black market in many materials; and the need for buying higher priced items that are at best only equivalent to the regular low priced grades previously used.

Price controls may be retarding production in some instances primarily due to actual raise allowances by the OPA on raw materials without a corresponding allowance on the manufactured product. This supplies the main excuse for upgrading as the regular converter grades become unprofitable or less profitable to produce under the present price ceilings.

Demand is another factor that is adding to the price inflation trend. The present race for the full effect of inflation will hit with its maximum impact in the next six months.

The problem of industrial relations, while slightly more complicated, is no different in its basic principles or importance than it was yesterday.

Let us reiterate these basic principals and at the same time take inventory of what we have done as an Association.

1. *Thorough knowledge of the tasks performed by our workers and the relative value of the jobs*

This factor is of major importance, as without it we have no assurance of the equities involved. Job analysis, therefore, is the keystone to peaceful industrial relations.

Since the Association inaugurated its

(*) Abridged and adapted from paper presented before the annual meeting of the Waxed Paper Institute held at the Hotel Pennsylvania, New York City, on February 28, 1946.

job analysis project, thirty-one member companies have consummated a full analysis of all jobs in their respective plants. We are hopeful that all the members will do likewise, thereby enabling the Association to produce a composite job analysis graph of all jobs in the industry.

2. *Comparative wage payments of each unit to other competitive units and to the industry as a whole*

The Industrial Relations Committee, through the Association Secretary, has initiated the effort for compiling of wage statistics. Wage and other personnel data have been received from 31 companies. The summary sheets compiled from these data are in preparation.

A summary of the personnel data other than wages also has been compiled and will be distributed to participating members.

As a follow-up, blanks will be sent each month to each participating company for recording changes in wage rates and other personnel data; this information will be compiled and distributed to all participating companies promptly thereafter. In this manner all companies participating will be kept posted on all changes and trends within the industry.

3. *Clearly defined ideals*

Management, of necessity, must have clearly defined ideals of accomplishment. It is the duty of management to present these ideals to its partner, Labor, and to sell the program with true co-operative effort. The details of such a program should be sufficiently intimate to permit the most menial worker to comprehend the various steps and benefits to be derived by the organization if the goal or end point is attained. In many organizations today, Bill Jones, the worker, does not even know the name of the President or General Manager, let alone what he looks like.

4. *Collective bargaining*

Management, in the main, has not taken advantage of collective bargaining. To many industrial organizations, collective bargaining represents a trial and tribulation to be experienced every year in order to effect a contract effective (perhaps) for the following year. However, many managers have had sufficient business acumen to apply collective bargaining throughout the interim between contract negotiations. One of the many successful applications of this principle is to hold a weekly combined meeting of all chapel chairmen or union representatives and management supervision representatives with the general manager acting as chairman of the combined meeting. These frequent meetings have resulted in the elimination of many minor irritations that might otherwise become major problems. They also are of inestimable value in insuring a close knit fighting organization. They even have materially increased production and eliminated threats of strikes.

5. *Fair dealing and security*

There must be fair dealing if success in establishing the fact that both management and the operatives are concerned in the promotion of health, efficiency and material success of industry and American society, and are not serving opposing interests. This partnership has been a long time coming, but many signs today indicate its maturing in the near future.

6. *Adequate static accomplishment records*

As a "first" measure in endeavoring to secure permanently amicable industrial relations and truly enliven the interest of the workers in their accomplishments, *static production reports must be maintained.* There is nothing more confusing to the workers than changes in the base methods of compensation or form of reflecting their efforts. Especially is this true where an incentive bonus payment is made. Any and all changes are looked upon by labor as a means for management to take unfair advantage, and in many instances that is the motive.

7. *Working conditions for labor*

If management expects the worker to produce both quality and quantity of product, it must in turn supply conditions under which labor can perform efficiently. Fancy frills are not necessary but clean, healthy, and wholesome surroundings are.

8. *Efficiency rewards*

Some form of efficiency reward is essential if true co-operative effort is to be assured. Individual machine or hand operation production incentive, group production bonus, profit sharing and many other incentive methods are successful. In some industrial units, a combination of the individual, group, and profit-sharing bonuses has been found practical when superimposed upon the prevailing base hourly rates for the jobs in the industry.

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Labor, either union or not, can help materially in making efficiency more of its business. It will not block improvements if it is a partner. On the contrary, it will be asking for new methods, new machines, and improvements to present equipment.

To keep workers informed of what is going on is a matter of good business.

Labor without any numerical value in ergs or other definite measure, is not a commodity to be bought on the open market at the lowest figure. Two organizations in the same field and producing the same market products, for example, may vary in labor cost over 100%; yet the organization paying the higher wage may be the low cost producer. Surely, it should be the goal of management to organize labor and co-operate with it to achieve the lowest labor cost per unit at the highest possible hour rate.

Abridgments in this section are from papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry**, held in New York City, February 25-28, 1946.

Some Aspects of Pulp Mill Engineering

GEORGE WADLEIGH
Consulting Engineer

The intent of this paper is to outline certain features in the construction of a soda or kraft pulp mill which are commonly neglected in its original design. These involve real economies of operation and first cost and are sometimes added in crude form by the operating force which often has little engineering knowledge.

In the East and South pulpwood is obtained in lengths of 4 foot, 5 foot, and 5 foot 3 inches and of infinite diameters ranging from 2 to 24 inches, and within an infinite variety of weights. An average diameter for the South is 7 to 9 inches. Far Western woods are in another category.

The raw material is delivered at mill rough (with bark on) or peeled. The delivery is by car of various types—rack, box, flat, gondola, and even coal. The capacity runs from 12 to 20 cords. Trucks used are rarely of dumping type, the capacity being 1½ to 3 cords. Barges carry perhaps 100 cords. The volume of a cord, of course, varies with the dimensions, running from 128 to 168 cubic feet.

The best present procedure in unloading box cars is to limit the number of men to a car to not over two, have conveyors or receiving hoppers close to and below the level of the car floor, and so constructed, placed, and built that sticks can be thrown out at random. Rarely is special provision made for removing the wood piled between the doors readily, this wood taking twice the man-hours per unit to unload as does the balance of the car after a floor has been established. A movable platform over conveyor adjoining car is recommended. At some of the older mills, wood is transferred from the delivery car directly to a dolly car which is pushed to the chip house, such wood requiring the placing of each individual stick. This costs twice as much per unit as when the wood can be thrown out of the car door at random. Raising the outer rail of an unloading track about 4 inches has been found to reduce unloading costs about 20%. It is far from common practice.

Where stake cars are available, such as are in common use in the South, the problem of unloading is simpler, the cords per man being about double that of box car unloading and more men can be used per car. The cost of such unloading can be further reduced by the use of a crane with a proper bucket or the use of one or another power device not yet on the market.

Truck wood is commonly unloaded by hand, the cost of so doing "apparently" falling on the vendor. There is no real reason why such standard trucks should not be run onto a tilting platform and mechanically dumped as is done with cottonseed, coal, etc. The time for this operation is about 1 minute against 25 minutes that is required for hand unloading. The cost of dumper would run from $4000 to $7000. To receive several cords from a truck, a batch receiving device in the shape of a special hopper or small

pond will need to be provided. Less expensive than hand work is that accomplished with a light crane and clamshell bucket. This requires co-operation on the part of the trucker as to placing of stakes and chain arrangement.

Wood received from the river or sluice in pulpwood lengths is often expensively handled. The conveyors should have feeding devices such as overhead chains, suction drawing the wood in against the conveyor, and the width great enough to permit wood at random to come against the conveyor. Ultimately this wood needs to be paralleled in order to travel successfully on a delivery conveyor of any length.

The receiver of pulpwood sticks from car or truck may be a conveyor chain or cable and buttons or a dolly truck; occasionally a sluice with slow-moving water, sometimes such with swift water; at times a piler with its lower end butted against the car, this latter conveyor creating conical piles.

Conveyors parallel with car tracks should be of such width that wood will rarely be thrown across them, and of such shape that wood sliding down their 25 to 35 degree sides will not strike the chain or cable end on. The unloading conveyor section should permit numerous cars unloaded at once or without much switching, adhering to the rule with box cars "not more than two men to a car." Where the wood is to go direct to pile and a portable piler is used, side feeding conveyors are necessary to keep the main feeder up to capacity. Variable speed drives for conveyor work are advocated, thus adapting the wood flow to the capacity of the receiving equipment.

Under proper conditions a slow movement water sluice as a receiver and conveyor is excellent. If used, it should be of sufficient depth to protect the bottom from the blows of the wood. It should have heavily protected edges and sufficient storage capacity so that the batches received from the cars and trucks can be equalized producing a continuous operation of the barking, sorting, and chipping equipment. With proper design this will serve for either floating or non-floating wood. The disadvantage of water conveying is the wetting of the bark which lowers its fuel value. Unfortunately, bark, except as a fuel and under certain conditions for tanning extract, has been found to have little value so far. It is a miserable filling material for low ground, is not desired by the railroad people as freight, and contaminates rivers and waterways when it is dumped into them.

In the yard, wood must go to the pile or barking drum or chip house via conveyor or sluice. There can be an increase in safety and manpower can be saved by better design of conveyor transfer points.

The necessity of men getting close to nearly vertical, at random, storage piles in reclaiming is a most dangerous practice and such work is high in manpower because of the attention each operator must give to his personal safety. The use of a crawler crane with orange peel bucket saves at this point; where one swing from pile to receiving conveyor will reclaim at a figure of 20 to 25c per cord, which is a fair amount.

Where racked storage is used, the crane and special wood bucket can eliminate much labor.

A decision as to storage piles between conical, at random, against racking depends upon the number of species of wood, length of seasoning, ground area, wood delivery, whether peeled or not, and various other factors.

The mechanics of barking drum design in detail would comprise a paper in itself. Practice in this country seems to limit the diameter to about 12 feet. Scandinavian countries have them up to 20 feet in diameter, and even more. Indications are that the barking capacity varies directly as the length of a drum and about as the cube of the diameter. Its relationship to speed is not yet established. Where several varieties of wood are in use, the drum will require frequent emptying to avoid mixing. Almost never is there any provision for quick unloading. This can readily be accomplished through making the delivery end dam mechanically adjustable as to height and perhaps placing the drum on a slight slope towards the delivery end. Here, in particular, adjustable feeding rates determining the time in drum through a variable speed feeder are desirable. An adjustment between thorough barking and a minimum of brooming requires close control of the time of wood in the drum by the wood inspector. He should be able to control this by the mere handling of a switch or button conveniently placed. About 15 cents per cord is a fair figure for drum barking.

The hydraulic barker calls for thorough consideration. It seems to be best adapted for straight wood in large diameters. The

power would be more than that required for drums. The bark has less value than that from dry drums. The manpower will be greater. On the other hand, the brooming should be less and the wood cleaner. The merits of the two methods can only be compared when power values, water supply, and bark disposal factors are known. Hydraulic barking will probably require a more skillful maintenance crew than is common in most wood yards.

Sorting of the wood in two ways is required—first, for cleanliness and, second, for size adapted to the chippers. These can be carried out separately or simultaneously, the wood passing over a sorting table with variable speed control. The table should be equipped with a quick acting hoist for the removal of heavy sticks, and ample facilities should be provided to send oversize wood to the sawmill or splitter or improperly barked back for a second trip through the barking equipment. The hand removal of defects in the rejects against brooming loss caused by a second trip through, needs evaluation.

Use should be considered of magnetic or radar means of detecting metallic imbedments in the wood between the point of sorting and chipping.

The use of the electric eye to count the sticks entering chip house can prove of value as a rough check on other means of wood measurement to obtain the true input to the mill.

Bark burning in the South with wood of 30 to 40 per cent moisture will produce about 3 pounds of 1300 B.t.u. steam per pound of bark if proper equipment is available. Northern woods under the same conditions should produce about 85 per cent as much but it is quite commonly thrown away. Neither pays for the additional handling cost and freight on rough wood.

Wood yard drainage is a rather commonly neglected factor. As crane and bucket or crawler type come into more usual use the need of a well drained yard becomes more apparent.

An early study and decision as to the hours of operation of drums and chip house is a necessity and fixes the size of equipment. Night work is very expensive and justified only in emergency. In spite of this, the irregularity of wood deliveries will make night operation on some occasions imperative.

Lighting of such yards is rarely adequate.

In setting up the chipping arrangements the importance of uniform chips of proper length is rarely given sufficient weight. It is intimately tied in with the cooking yields and quantity of screenings. If liquor penetrates nine times as fast endwise of the chip as sideways, the proper dimension balance should be worked out by the research departments and the equipment of the chip house adapted thereto.

For uniform chips, the chipper should be a rugged machine with precision bearings, both radial and thrust, adequately powered, and with all knives capable of easy removal and precise setting to 1/32 inch or closer. The spout should be slightly smaller at throat entrance than at exit. This will prevent many jams in the throat. Much use can be made of a quick acting hoist with heavy tongs to remove jamming pieces.

The Scandinavian countries make much use of chippers with discharge nozzle pointing upward at 45 degrees or thereabouts. Chips can in this way be elevated 15 feet or more, avoiding much elevator construction at the expense of more power. As a plant with modern power equipment can afford to expend 100 to 150 horsepower if a job can be eliminated, there is no objection to this method excepting that more breakage of "cards" may ensue. Proper design of blades on back of disk, piping, and receiving separator will prevent this from becoming excessive.

Delivery to screens can often be bettered so as to make use of the entire surface.

The common crusher for reducing size of screen rejects is an inadequate affair and a good sawdust producer. Minimum sawdust is desired and only enough cutting to insure that length shall be that of standard chips. This cannot be accomplished by beating up improver sizes promiscuously. A cutting action is required, cutting strings and splinters into standard lengths. Two per cent sawdust with $6 or $8 wood and a 100-ton mill is one thing, with $20 to $30 wood, it is quite another. Fines and semi-sawdust, if to be used, should be stored and cooked separately under proper conditions.

The only present day excuse for bins over digesters is lack of sufficient ground room which should not occur in a new plant.

Elevated bins are more expensive, generally lack capacity, and provide little flexibility in cooking.

Adequate sectionalized bins provide room for storage of separate species of wood to be cooked separately, if desired. They provide for blending of the same species but from different districts and of different ages.

Bins should be larger at bottom than at top, avoiding arching, and be provided with mechanical feeding bottoms, avoiding pounding, rodding, etc., and permitting chip conveying equipment to run at full capacity to fill the digester quickly.

There is some latitude as to conveying method but for moving large quantities rapidly with low power, it is difficult to improve on the belt conveyor. This also permits of the use of the weightometer which with an automatic moisture sampler would do much to forward pulp mill accounting.

Carriage of chips to digester in its own cooking liquor has possibilities not thoroughly explored.

To take full advantage of easily emptied bins, digester throats should be at least twice the commonly used area. With modern steels, air-driven bolting tools, various clamping devices, and perhaps an air hoist, there should be no trouble in developing these large heads.

Chip packing in digesters with material increase in capacity is practiced in various ways; some are tied in with the introduction of the cooking liquor with the chips. This latter procedure calls for liquor not over 200 Fahr. The hotter the liquor can be introduced (preheated by inexpensive low pressure steam costing about half of that at cooking pressure) the cheaper the process and the quicker the cooking time. Some years ago, an attempt to introduce liquor well over the boiling point would have been extremely difficult, this trouble being as much due to valves as anything else. Now, with stainless steels and with proper piping, there should be no real difficulty in perfecting such an arrangement. The most accurate measure of liquor is by tank though a high-grade flowmeter would give a measurement at least as accurate as that of the wood.

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Such would avoid the expensive practice of open tanks on elevated platforms often used with crudely designed heating coils therein. Tubular heaters in the liquor feed to digesters can give the final lift in temperature required. Again, careful engineering design of these is required, especially in sulphate liquor with its corrosive qualities.

Concerning digester circulation, the Scandinavians have developed several methods using a screen about midway in height delivering most of the liquor at the bottom with some at the top. Tests made with common circulation delivery of liquor on top of the chips generally indicate an initial pumping rate close to the designed rate with very rapid recession to one-half or one-third of that desired. The hydraulics of the system, particularly strainer location, arrangement, and cleaning methods, are rarely thoroughly developed. It is rather obvious that all liquor should enter at the bottom, be well distributed, and be drawn from the top above the chips. Piping and strainer system to accomplish this is entirely a possibility. The relief can no doubt be worked into the same arrangement. Here, again, stainless steels prove their work, always bearing in mind that cold working of stainless such as rolled in heater tubes, drops much of its noncorrosive value.

Circulation pumps themselves frequently omit the qualities needed for low maintenance, such as ample packing room, lantern glands with interior pressure of water or weak liquor superior to the digester pressure, glands with only one point of adjustment, over-size shaft, cooling water on bearings, ability to dismantle without removing piping, proper motor protection, and sufficient stainless parts.

Digester supports should be designed for even load distribution rather than strength alone. In one instance where perhaps eight lugs were furnished on a digester supported on steel amply strong. the support design permitted deflection at certain points, unduly straining the digester plate at the alternate points.

The modern conical bottom does much to eliminate secondary blows to clear the digester but the screen arrangement too commonly eliminates part of the gain. Secondary blows are decidedly expensive, both in steam and time. Steam piping, steam control, and safety valve arrangements should not be left to the operator or pipefitter to work out.

The pulp industry has been very slow in adopting heat recovery at the point of digester blowing notwithstanding that in its simplest form the cost of heat recovery equipment is low and pays for itself at a high rate. Where a cyclone is used for steam and pulp separation, it is rarely designed in accordance with developed tests on centrifugal separation nor is the steam and vapor piping designed otherwise than in following precedent. The disadvantages of blowing to too great heights of cyclone need more consideration as does the piping friction factor and the size of the blowpipe.

Passenger elevators are rare in the older digester buildings. Why doesn't the industry copy the flour mill operators with their man lifts and save the operators' legs?

No attempt is made herein to compare the merits of tumbling digesters, continuous cooking, counter current, and vacuum chip treatment. The latter three are not in usual use though the Asplund disintegration of partially cooked chips is an actual continuous cooking, and is in operation in a number of plants.

Someday some mill man will install a modified de la Rosa outfit using a tall tower requiring no entrance packing thus emulating to some extent the oil refiners who are not afraid to go into the air. As to vacuum treatment of chips, it is so common in the impregnation of wood for preservation it is hard to understand its lack of use in pulpmaking in shortening the cook and producing a more uniformly cooked fiber.

In the case of sulphate and soda washing, operators are far too content with, say, 1½ gallons of liquor per pound to the evaporator when proper hydraulic handling of the problem would mean a dilution of cooking liquor to not much more than 1 gallon and for a 100 ton mill a saving of $10,000 to $20,000 per year in quadruple effect evaporation. The merits of the six known washing methods; true diffuser, pan, vacuum, filter, centrifuge, press, and dilution will not be compared. The success of the first three depends on displacement and the main-

tenance of a sharp line (a flat surface) between the liquors of different strengths. As the areas over which this line should be maintained are large, very slight variations in the displacing head at any point and the resistance of stock to flow make large undulations in the surface. One liquor should follow another as a piston. The builders of continuous filters recognize this necessity in their arrangement of large liquor capacities of passages and provision for getting a quick and uniform thickness of cake on the filter. A diffuser and pan designer rarely provides for even stock distribution nor for the introduction of the following liquor without penetration into the preceding liquor. Too many times the draining arrangements are faulty, the piping and connections allowing the liquor to move more rapidly through one section of the bed than another. Sometimes this trouble is due to the operator, as an instance in the author's experience, leveling his stock with weak liquor instead of using the strongest available.

Pan and diffuser screen bottoms are often designed with no expansion provision resulting in cracked, perforated plates which should be of stainless steel resting on corrugated support and eliminating the crimped screen of short life often used.

Mechanical washout of pans and diffusers is not common in this country though thoroughly practicable and much used in Scandinavia. The insulation of the walls of such facilities saves heat and inequalities in temperature, the latter resulting in local currents and the mixing of the liquors.

In filter washing, too little weight is given to the time element necessary to the osmotic or diffusing action in getting one liquor out of the fiber and another one in. This time element can be aided by the use of several stages with intermediate storage tanks. The cost of these must be evaluated against the soda loss.

To avoid pumps to produce the suction necessary to the vacuum washers, the dropleg is commonly used. This, while simple, is not always the best. It compels the high elevation of large volumes of liquor and high supports for the washers and is none too good as a gas remover.

In the handling of pulps the greater first cost of equipment carrying 1½ per cent of stock needs to be more carefully balanced against the three times greater power and smaller equipment required to move a similar quantity of 3% stock.

An increment value of power costs for the use of the designer and operator, rather than the overall costs as shown on the company books, would ordinarily add much to getting the best balanced design for the purpose desired.

As to dilution washing, the use of numerous deckles in series with wash material counter-current carefully worked out has shown results about equal to those of displacement washing. Further study of this method in the light of modern equipment is recommended. Whether some partial mechanical treatment of the stock by some form of disintegrator prior to washing is of real advantage needs more study and experiment.

The present drive for stream and waterway purification makes the problem of stock washing with minimum dilution and maximum chemical recovery a paramount problem in pulp mill engineering.

The recovery plant should not be considered as part of the pulp mill but as a separate operation such as making caustic soda, sodium sulphide and steam. It should have its own cost accounts showing heat and chemical balances as does the power plant.

Many of the departures from usual methods suggested herein call for higher grade operators than are commonly employed. This is admitted, but the total number of operators should be less, as well as maintenance, and the availability of units greater.

The author's plea is, first, for more time for engineering study of a new plant before work is started, giving opportunity to make use of advances in other industries, and, second, for operators with better machine training who will maintain and get out of that equipment all that it was intended to accomplish.

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Studies of Dielectric Properties of Chemical Pulps*

1. Methods and Effects of Pulp Purity

CYRIL DELEVANTI, JR.[1] and PAUL B. HANSEN[2]

The presence of water in cellulosic material exerts a profound effect on its specific inductive capacity and power factor. In general, increase of moisture content is accompanied by increases in these electrical properties, the power factor being very strongly affected.

Uncertainty still exists about the possibility of removing all the water from paper.

The presence of chloride ions is especially deleterious, particularly in direct current service.

McLean, Egerton, Kohman, and Brotherton (*Ind. Eng. Chem.* 34:101-109, 1942) suggested that the superior ability of unbleached kraft paper, as compared with bleached paper, to absorb cations is partially responsible for their longer life in D.C. units impregnated with chlorinated organic materials.

The behavior of cellulose in alternating fields strongly suggests that the polar hydroxyl groups are partially responsible for the effects observed. Stoops (*J. Am. Chem. Soc.* 56:1480-1483, 1934), Hill (*J. Applied Physics* 8:607-613, 1937), and Campbell (*Proc. Roy. Soc.* A78:196-211, 1907) point this out in work on regenerated cellulose and cellulose derivatives.

It is an established fact that the behavior of cellulose in alternating fields can be attributed to reversible absorption, and that losses resulting from true conductivity account for less than 1% of the total loss in well-dried paper. The causes of reversible absorption is structurally heretogeneous material are, however, still obscure.

Polarization in a dielectric is considered to be the cause of all absorption phenomena. Murphy and Morgan (*Bell System Tech. J.* 16:593-512, 1937; 17:640-669, 1938) have given a thorough survey of the various types of polarization, which they list as electronic, atomic, Debye orientational (dipole) polarizations, and interfacial polarizations. The last two are of greatest significance at all frequencies up to the infrared region of the spectrum.

Morgan and Yager (*Ind. Eng. Chem.* 32:1519-1528, 1940) have discussed the effects of polarity, dipole moment, viscosity, molecular structure, and temperature on the specific inductive capacity and loss factor of various organic liquids and some of the synthetic polymers. It is suggested that, for substances having very large molcules, elastic movement of polar substituent groups in alternating fields may be responsible for some of the phenomena observed.

Murphy and Lowry (*J. Phys. Chem.* 34:598-620, 1930) have considered in detail, with particular reference to cellulose, the interfacial polarizations mentioned in the preceding paragraphs. They postulate an "interstitial conduction system" which follows some feature of the submicroscopic structural pattern of the material. Using

*A portion of dissertations submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wisconsin, 1943. This work was carried out under the direction of J. A. Van den Akker.

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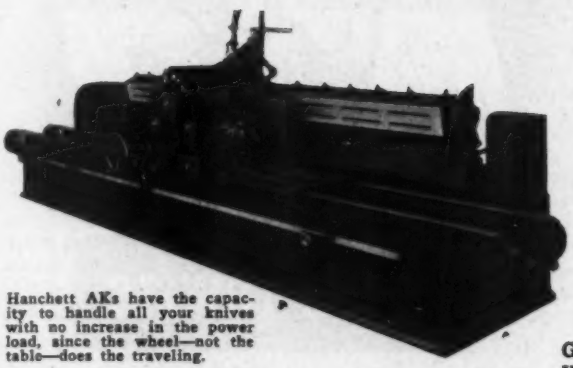

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their assumptions, they were able to explain the form of the current-time curve, the Hopkinson-Curie principle of superposition (which states that the current in a dielectric at any instant is related to previous changes in impressed field strength and polarity), and the power losses observed. It is noteworthy that, by the use of the equivalent circuits they propose, they were enabled to obtain expressions for specific inductive capacity and loss factor similar in form to those derived by other investigators for homogeneous materials.

The main features of the apparatus employed to measure the dielectric constant and loss angle of speciments under various conditions of temperature and desiccation include (1) a test capacitor with a guard ring contained in a chamber capable of evacuation to low pressures, (2) an electrode arrangement whereby the electrodes can be separated or brought together *in vacuo* to permit drying of the paper specimen, and (3) a suitable electrical bridge with auxiliary apparatus for measuring the dielectric constant and loss angle of the test capacitor.

The capacitance and loss angle of the test capacitor were determined with a conjugate Schering bridge (A.S.T.M. Tentative Method D 150-41T. A.S.T.M. Standards 1941 Suppl., Part III:375-403).

The bridge was energized with a-c potentials of frequency covering the range from 60 to 10,000 cycles per second.

In certain experiments the cell was flushed with nitrogen, which was prepared by passing commercial nitrogen through a train comprised of a large tube containing electrically heated copper, and drying tubes containing anhydrone, phosphorus pentoxide, and glass wool.

The apparatus is so designed that it is possible accurately to measure the spacing between the test electrodes in the cell while the latter is evacuated, and the specimen in equilibrium between the electrodes.

Prior to an investigation of pulping variables, it was desired to obtain data on certain technical factors, for which purpose a commercial unbleached kraft pulp, specially washed for the manufacture of condenser tissue, was employed. Two methods were employed for the preparation of test sheets from the commercial pulp.

Sheets formed by Method I have a matt finish, and those by Method II have a smooth finish and a high density.

Before using a test sheet, it was visually inspected by transmitted light for imperfections which would give rise to an unnecessarily high electrode spacing. Any such irregularities were carefully removed by means of a sharp razor blade.

In order that the moisture content may be reduced to a very low degree, it is necessary to heat the specimen and reduce the partial pressure of water vapor surrounding the specimen. Simple exacuation of the gases in the test chamber is the method ordinarily employed to reduce the pressure of water vapor. If the water vapor in the chamber is flushed out of the chamber by filling it with dry nitrogen to a pressure of several cm. of mercury, the partial pressure of the water vapor on evacuation will be exceedingly low, being a small fraction of one micron (the fraction will be approximately the ratio of the partial pressure of moisture in the dry nitrogen to the total pressure). As more moisture is given off by the specimen, the partial pressure will rise and flushing may again be necessary.

Flushing was performed with oxygen-free, dry nitrogen every half hour during the first four hours.

The results obtained in the study of the influence of flushing indicated strongly that minute, accidental leaks in the apparatus caused a continuous flushing with atmospheric air. If the leaks and pumping rate are such that the pressure in the chamber is one micron, the partial pressure of the water vapor in the chamber would eventually approach about 0.02 micron, the exact value depending upon the dryness of the atmosphere surrounding the test chamber and connections. The beneficial effect of a slight leak appears to be generally recognized.

An unexpected dependence of loss angle on temperature was found. On reducing the temperature, it was observed that the loss angle increased [according to Race, Hemphill, and Endicott (*Gen. Elec. Rev.* 43:492-499, 1940), reduced temperature cause a decrease in certain pulps and an increase in others], but that it did not decrease along the same path when the temperature was increased again.

Even at constant relative humidity, cellulose absorbs more water at lower

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temperatures than at higher temperatures and, in the present case, it appears certain that the relative humidity in the chamber would be higher at lower temperatures.

STUDY OF EXPERIMENTAL PULPS

Three kraft pulps were prepared in a laboratory digester for the second part of this study. The characteristics of these pulps are listed in Table 1.

Table 1—Unbleached Pulps Used in Investigation

Pulp	Permanganate No.	Lignin, per cent	Pentosans, per cent
I	28.8	6.8	8.5
II	26.4	6.0*	8.3
III	17.5	2.3	7.6

(*) Estimated.

In addition to these pulps, a kraft pulp which had been prepared in a laboratory to a degree of cooking about the same as that of Pulp III and given a one-stage hypochlorite bleach was obtained for study. This pulp is designated as Pulp IV.

Sets of sheets were prepared from the pulps listed in Table 1, and from the bleached pulp IV.

Part of the rapid rise of loss factor at the upper end of the frequency range, can be attributed to the presence of inorganic material. However, the consistent differences exhibited at all frequencies are taken to indicate that lignin is partially responsible for the dielectric losses in kraft paper. The presence of other constituents, such as the hemicelluloses, may be partially responsible for the observed trend with lignin content, although the pentosans content in Pulps I, II and III (Table 1) are similar. In any event, the result for the bleached pulp is taken to mean that the lignin is not largely responsible for the observed loss factor.

It is appreciated that lignin isolated from wood or pulp may not behave, under electrical stresses, in the same way as lignin associated with cellulose in fibers. Nevertheless, it seemed desirable to investigate the properties of a sample of native lignin which was isolated from black spruce by Dr. Brauns of The Institute of Paper Chemistry.

The trends exhibited by the material are of interest. There is distinct dispersion of loss angle and loss factor with change of frequency, and raising the temperature causes the maxima of the curves to shift to lower frequencies. This behavior is characteristic of polar compounds. It is conceivable that these effects are due to the highly polar hydroxyl and carbonyl groups known to exist in lignin.

Although the density of the sample was very low, the observed values of dielectric constant and loss angle were substantially greater than values of these properties for the least dense paper tested. At a density of 0.8 gram per cc., therefore, lignin could be expected to have much higher values of dielectric constant and loss angle than paper of the same density. This correlates with the evidence which shows these properties to increase in value with increases of lignin content.

The authors wish to acknowledge with thanks the invaluable assistance given by Dr. J. A. Van den Akker, Dr. George R. Sears, Dr. C. J. West, and others of The Institute of Paper Chemistry, in the carrying on of this work and the writing up of the results.

The Future of Printing —As We See It

F. A. WEYMONTH
Plant Manager
International Printing Ink Div.
Interchemical Corporation

It is believed that the author's thoughts on the future of printing are reasonably unbiased since the ink industry is equipped to produce typographic, offset, aniline, and gravure inks. The ink manufacturer does not necessarily have to play favorites with respect to one type of printing process. The ink manufacturer has the same feeling about producers of various types of papers and presses. His job is to make the various inks required for these processes and to fit them in with the minimum amount of difficulty as far as the printer is concerned.

In a general way, the ink producers feel very definitely that the accent of the printing of the future will be on improved printing with both black and white and color work, but produced at higher speeds. In typographic rotary printing, the web speeds will be increased markedly as new presses are built. Printing performed on sheet delivered presses, whether offset or typographic, will be aimed towards the goal of faster printing and faster drying

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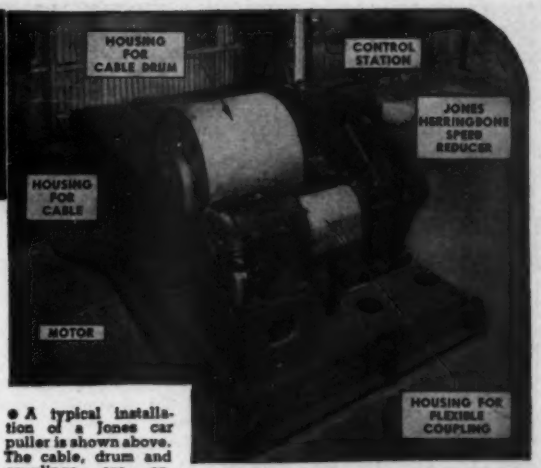

● A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

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speeds. The plans for increased amounts of color printing are universal in all divisions of printing.

It is believed that the standards for printability will definitely be raised as rapidly as possible. There are indications already that the general poor quality in printing performed during the war because of substitutions in paper, ink, and generally inexperienced labor throughout all phases of the industry is rapidly coming to a close. Already there has been considerable pressure on improved printing by the buyer of printing. This will impose quite a number of problems, and in a greater degree on the higher speed web typographic presses, if it is possible to judge by the past. Higher speeds demand thinner inks and these lower ink viscosities do not improve the quality of the printing. At the same time, with the higher speeds planned for paper mill production, the paper mill will be hard pressed to keep up the quality of paper comparable to those made with lower machine speeds.

Newspaper publishers and advertisers are very much interested in improving the quality of their printing. There have been all manners of discussions about running better papers on front and back pages. There has been no point in changing the paper to a smoother surface, and even one which is slightly coated, unless the problem of obtaining an ink which will dry and not smear is overcome.

Experiments have been under way for some time in order to eliminate second impression offset and rub of news ink. These are not conventional types of ink. In the past, the conventional type of ink has been made from carbon black and mineral oils. The new type of ink consists of carbon black but in a vehicle which allows the ink to dry by a method other than absorption. Tests of steam-set type inks have been reported as encouraging (Steam-set ink test. *Editor and Publisher*, pg. 76, October 13, 1945).

Web publication (magazine) and catalogue printing will reflect a number of changes both as to quality and brilliance in the months to come. A limited number of experiments were tried during the war and more are in the offing with respect to improvement of the black and white printing and multicolor process printing (Dalton, Pros and cons of multi-color printing. *Am. Printer*, December, 1944). A problem of the present heat dried printing is that too much heat must be used, especially on heavier weight papers. Less or no heat would be desirable since the present methods tend to dull the color work and in many instances show burn spots on the web. The web must be heated at present at such a high temperature that there has been a resultant embrittlement of the paper. This causes the magazine pages to pull out of the stitching.

Gloss ink printing for sheet fed typographic presses will again be on the increase as soon as papers become more and more available which are suited for gloss ink printing.

Rotary bag printing such as that produced for coffee bags is presently being printed with heat dried gloss inks. There seems to be reason to believe that this will continue.

In the field of carton printing, there already are evidences of increased interest in gloss ink printing. Vaposet (moisture setting inks) are also increasing in interest to the carton printer because of their lack of odor. These inks are being run in a small way at the present time for particular jobs where odor is a problem.

Vaposet inks have already found wide use in the field of breadwrapper printing. Breadwrappers are rewound immediately after printing. The advantages of the Vaposet inks have been their lack of odor and the fact that they will dry thoroughly to the core in the matter of an hour or so allowing the rolls to be waxed promptly.

The general consensus of opinion, based on orders for new presses and surveys by trade journals, indicates that there will be a great increase in the amount of offset printing. There are quite a number of typographic printers installing one or more offset presses in order to augment the printing facilities of their shops. A general impression gained also is that the use of coated paper for offset printing will greatly increase. It has been observed that color values have more brilliance when printed on coated paper as compared with uncoated. There is a noticeable trend in the increased use of offset printing among the finer grades of cartons. During the war some well known brands of soap cartons were lithographed and a creditable

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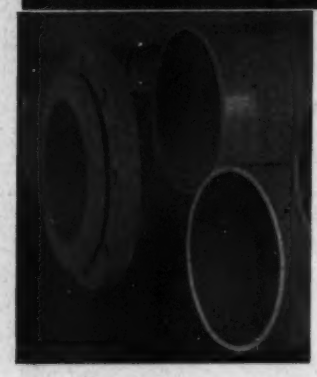

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job was performed. The industry is rapidly improving its position by scientific studies of the "art of lithography" (Wood, Litho improvements. *Modern Lith.*, July, 1945).

The control of the drying of offset inks is not as easily handled as that of typographic printing (Ink drying troubles. *Modern Lith.*, April, 1945) (Lithographic Technical Foundation Bulletins). It is very difficult to tell the amount of water that is being run on the dampening mechanism and subsequently on the non-printing areas of the zinc plate. This water emulsifies the ink and it is very easy on certain forms for the ink to become water-logged. Hence, with the same ink running the same form on the same paper on a number of consecutive days of running, drying results may vary from a relatively short period of time to a matter of 2 or 3 days. This is an ink problem, and it is a press manufacturer's problem. If an ink can be developed which will dry the same irrespective of the amount of water present, or if a press builder can manufacture a dampening mechanism which will apply a known volume of water, this difficulty will be solved.

A new type of ink called "Vapolith" has been running successfully commercially during the past two years. This ink is a heat dried lithographic ink. The black and white printing of one edition of a news magazine is lithographed by this method on roll fed, signature delivered, Webendorfer presses. After one side is lithographed the printing goes through a heater to dry the same and then the reverse side of the web is printed and dried again in the same manner. It is entirely possible to print four-color offset with the Vapolith method.

The use of such a method whereby the offset process can be used in publication printing is tied up with developing a suitable lithographic plate which will run for a minimum of several hundred thousand or more impressions without the usual attendant difficulties of present lithographic plates. Considerable work was started before the war and a small amount has been continued during the war on steel plates (Batcheller, Stainless steel offset plates. *Modern Lith.*, May, 1945), multiple metallic plates, etc., which if finally developed, would fit very nicely into this process. As yet, there has been no side commercialization of these plates and the work has been confined to a few spot tests.

Very great strides have been made in gravure printing during the past few years, particularly in the publication field. Four color reproductions on relatively low cost groundwood type papers have color values which are not reproduced by any other printing process. The present day gravure presses operate at very high web speeds and a considerable number of additional presses are being built. One of the difficulties with the gravure process has been in the duplication of cylinders and this is tied up with problems involved in etching. Progress has been made in perfecting cylinders.

There has been an increased use in gravure for printing long runs on materials like cellophane. Gravure is desirable because of the fact of its instant drying.

There will be a very rapid rise in aniline printing. The name "aniline" is really a misnomer since it stems from the original inks which were solutions of dyes in alcoholic shellac. Many present day aniline inks are pigmented. There are a great number of presses on order and since they are relatively simple in design, it is expected that quite a number of these will be in operation before the end of the year. Aniline is desirable for packaging because of its instant drying on materials like cellophane, glassine, and other transparent, more or less impervious wrapping materials. Aniline is being used in the printing of many candy wrappers, paper bags, wrapping papers, window signs, etc. (Bates, Aniline printing. *Print.* Fall, 1945).

Shortly prior to the war and during the war, many new plastic sheetings were developed. It is now expected that these will be commercialized. All of the specialty printers in the country are seeing what can be done with these new products. In the general list of these materials such products as cellophane, cellulose acetate, cellulose nitrate, ethocel, pliofilm, vinylite and others will be found.

The immediate future of printing will be chaotic for some months to come until reconversion is fully effected. Meantime it can be expected that buyers of printing will stress quality and increased produc-

tion. The papermaker, press builder, ink manufacturer, and printer will be hard put to meet these more exacting postwar demands.

Functional Papers

R. H. MOSHER[1] and R. S. BRACEWELL[2]

The class of papers which are termed "funtional" include those which possess some specific function other than the ones generally associated with a paper sheet. The list of such functional papers includes those which are greaseproof, water resistant, gas or moisture vaporproof, scuffproof, heat sealable, magnetically or electronically sensitive, and electrically conducting.

It is possible to impart some functional properties into the sheet by altering the form of the cellulose itself. By extensive beating and hydration of the fiber, such as is carried out in the production of a glassine sheet, a paper can be obtained which has to a large degree lost its fibrous structure. In the resulting sheet, the fiber to fiber bonding has been greatly increased, the amount of interfiber space has been drastically reduced, and a number of changes have been made in the direction of "functional properties." The sheet is smoother and has greatly improved wet strength and scuff resistance. It has assumed some degree of water resistance and is practically greaseproof. The moisture vapor transfer rate is still very high, however, and under prolonged soaking the sheet softens and can be easily disintegrated. Another method of obtaining similar properties involves "parchmentizing," or treating the base sheet after production with chemical agents which tend to gelatinize the fibers. Approximately the same functional properties are produced as in the glassine, except that with the parchment sheet, the resistance to defibering on extended soaking in water is much better. In general, the glassine is only produced in the low basis weight range, while the parchment is produced in heavier stocks.

In many cases the physical properties or cost requirements of a sheet are such that it is not possible to use glassine or parchment papers as the basis for production of the desired functional sheet. Wherever possible, however, the converter will start with a sheet possessing as many of the required properties as possible.

In most cases, the converter will obtain a base stock which possesses the required physical strength properties and then by the proper treatment impart the remaining functional requirements using a treating or coating operation. By treating or saturating the paper with a solution, emulsion, or dispersion of the proper resin, so that the open spaces between the fibers are to some extent filled in, not only can water resistance, scuff resistance and greaseproofness be greatly enhanced, but where the material is compatible with the cellulose, the fiber to fiber bonding is improved with a resulting increase in the physical strength properties of the sheet. Where the saturating material is not compatible with the cellulose, such as with a dry waxing operation, the functional properties will be obtained, but the over-all physical strength properties of the sheet will be reduced. In both of these cases, the moisture vapor transmission of the sheet will probably be quite high, since there are free cellulose fibers on the surface and down through the mass, and they will transfer the moisture through the sheet. The water resistance of the sheet will be tremendously increased.

The other method of treating which is available for producing functional properties is to coat the sheet with some compound which will impart the desired functons. Such a coating can be composed of a synthetic resin or plastic compound, waxes, asphalt, or some combination of materials which possess the desired characteristics. The applied layer may be continuous or non-continuous, depending upon the properties required and the method of application. If greaseproofness, heat sealability, water resistance, scuffproofness, etc., are desired either variety of film is applicable, but if gas or moisture vapor resistance is necessary, only the continuous type coatings can be used.

The raw stocks which the converter uses to produce his functional sheet may be previously untreated or may have already been processed to some extent. When it is possible to do so, the converter will use

[1]Laboratory Director. [2]Vice President, the Marvellum Company.

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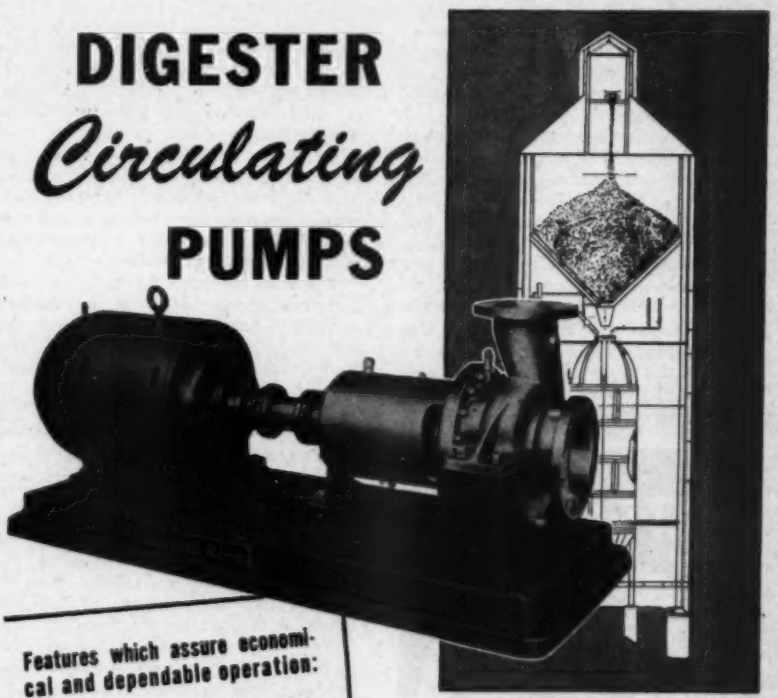
PUMPS



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a paper which has been treated to produce high wet strength and one which has been coated or calendered so that when the functional film is applied it will remain on the surface and not sink into the sheet any further than is required for secure anchorage. In some cases, the converter will start in with a parchmentized or glassine sheet which already possesses some of the functional properties which are necessary in the finished sheet.

The coating may be applied by the use of any of several techniques, and each has advantages and disadvantages. The oldest and best known method involves the use of lacquers or solvent coatings. Using this method and utilizing the appropriate resin base continuous films can be produced which offer good moisture vapor and gas transmission resistance, excellent greaseproofness, heat sealability, scuff resistance, and water and oil resistance. Special properties such as electrical conduction, magnetizability, fluorescence, and electronic sensitivity can be obtained by incorporating the proper types of pigments or compounds with the lacquer. The major disadvantage of this method of coating are the difficulty of producing bubble free coatings in the thicker gages, the high viscosities at low solids content, and the cost of eliminating and recovering expensive solvents.

The second coating procedure involves the use of water borne emulsions or dispersions of synthetic resins and other film forming compounds. The materials can be applied to the paper using any of the well known coating techniques with proper adjustment of the properties of the dispersion for adaption to any specific application. This method possesses the advantages of a cheap, nonrecoverable solvent, no fire hazard, and since the solution viscosity is not dependent upon the chain length of the resinous constituent, high total solids can be utilized. In general, the water wicking into the sheet immobilizes the coating and the water is easily removed since there is no formation of a continuous resin film to cause entrapment until the water has practically all been removed. In most cases a short treatment at temperatures in the range of 400 Fahr. are required, because continuous films are only laid down by a few specific types of resins, and in most cases, the coating must be fused after the water has been evaporated off. Even the use of sufficient heat to produce fusing, however, is not generally sufficient to obtain a completely continuous film and in many cases the water sensitive emulsifying agent remains in the film, the gas and especially the moisture vapor transmission of sheets produced by this technique are generally higher than those produced by the lacquer or solvent method using the same base resin. Another disadvantage involves the swelling and distortion of the sheet which is encountered when using water as a solvent.

The third procedure for the production of coated functional papers involves the use of hot melts. There are two temperature ranges for hot melt application, one down in the range of wet waxing (between 140 and 250 Fahr.) and the second in the high temperature range (above 300 Fahr.). Hot melts can be produced which are based on waxes, natural resins, and cellulose base plastics, and the use of synthetic resins has been widely investigated. In most cases, however, in order to obtain the proper viscosity in the melt and still not have too much tack and softness in the coating, low viscosity synthetics must be used, so that the resulting coatings lack somewhat in strength and flexibility. Excellent continuous films possessing such properties as high gas and moisture vapor resistance, heat sealability, greaseproofness, scuffproofness, pigmentation properties, and water and oil resistance can be obtained. It is only rarely, however, that all can be obtained with any one material. The use of any type of solvents is unnecessary with the resulting elimination of drying and solvent recovery. A new development involves the use of high solids lacquers (70% solids) with high boiling solvents which are applied hot. The compounds produce the advantages of lacquer coated sheets using a modified hot melt technique.

One of the most recent developments in the coating field is the use of organosols or plastisols. These compounds contain the minimum amount of a solvent in which the resin is not soluble and are in effect highly concentrated dispersions. Their major advantage is that they produce relatively low viscosity coating mixes at room temperatures. The solvent can generally be removed at medium temperatures and then in a short high temperature bake is applied to fuse the particles and produce the continuous film. Since a solvent less polar than water is generally used, there is no swelling and resulting distortion of the cellulose sheet. It is felt that this type of compound will fill the gap between the resin dispersions and the hot melts. When using them the properties of low moisture vapor and gas transmission, heat sealability, greaseproofness, scuffproofness, and water and oil resistance can be obtained. In general, however, only relatively thick coatings can be applied.

A new war development in the functional paper field involves the use of the Dri-Film process, wherein a thin film of silicone resin is deposited on the surface of a sheet of paper. The sheet is passed through a chamber containing the silicone resin vapors and the resin is precipitated on the surface of the sheet through reaction with its residual moisture. Such a film is not continuous, however, and although the sheet possesses excellent electrical, water, and oil resistance, it offers no gas or water vapor resistance.

It is common practice to prepare laminations using two or more treated or coated papers, each of which contributes some specific property to the finished sheet, since in products such as these, most of the functions are additive. The only requirement is that the proper functional sheet be placed in the correct position (i.e., the greaseproof side placed where it will contact the grease). When one uses laminations, there is also the added advantage of being able to use the laminating adhesive to supply a functional property, such as moisture vapor resistance. An example of such a sheet would be a kraft base sheet coated with a heat sealing, greaseproof, coating which is laminated with a moisture vapor resistant wax to a coated and printed bleached sulphite top sheet (for decorative or legendary effect).

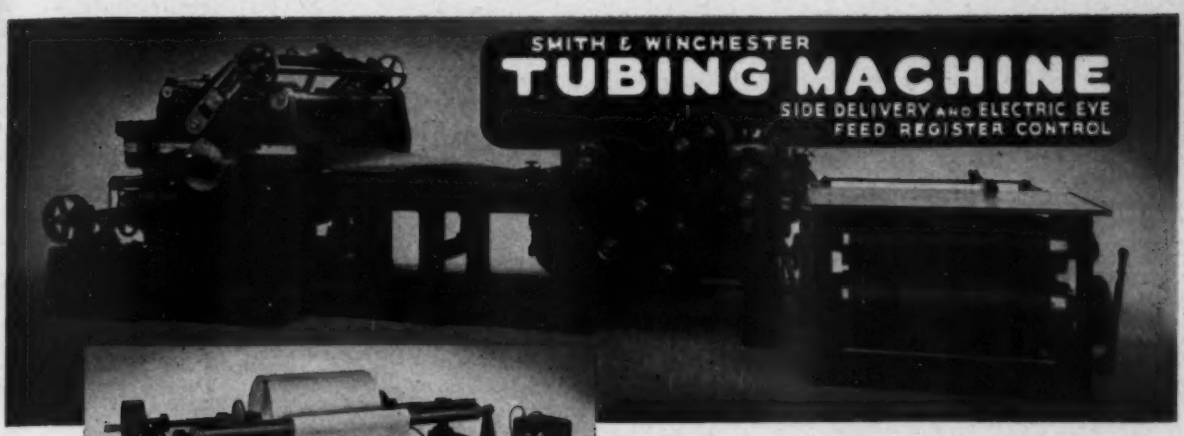
Relative Toxicity of Disinfectants Recommended for Use in the Paper Industry

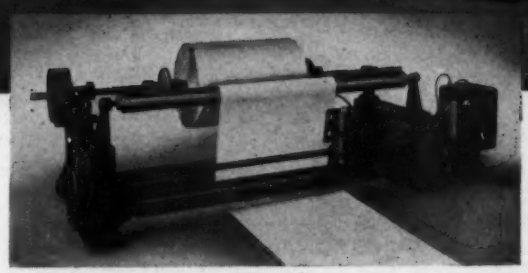
III. Inhibiting Concentrations of Additional Disinfectants for *Aerobacter aerogenes*, *Bacillus mycoides*, and *Aspergillus niger*

JOHN W. APPLING[1] and JOHN F. McCOY[2]

By means of the Petri plate method of evaluation as described in the previous articles (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 119, No. 11:116-118, September 14, 1944) (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 121, No. 3:37-40, July 19, 1945) of this series, the inhibiting concentrations of an additional nine chemical disinfectants have been determined for the three test organisms previously used. The testing techniques for the use of *Aerobacter aerogenes*, and *Bacillus mycoides* and *Aspergillus niger* were employed with one necessary modification for obtaining the data reported in this paper. This modification was applied to the four disinfectants that were supplied as liquids, namely, Caso-Cide (Permacide 9M-10), Emulsept E 607 Special, Ramplex C-106, and Roccal. Whereas the solid disinfectants were diluted on a weight basis, the liquid disinfectants were diluted on a volume basis and

[1]Research Associate, [2]Technical Assistant, The Institute of Paper Chemistry.





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all calculations were made as though a weight basis had been used.

The data reported have been based upon the materials as furnished by the manufacturer and not upon the amounts of active ingredients present in the materials.

A comparison of the ability of the disinfectants tested to inhibit the growth of each of the three test organisms has been made by calculating the average values for the inhibiting concentrations. For convenience and the establishment of a basis for comparison of cost-toxicity data, these have been computed in percentages and in parts per million. For purposes of comparison, the data previously obtained with Merfenel (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 119, No. 11: 116-118, September 14, 1944) (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 121, No. 3:37-40, July 19, 1945) are also given.

The average price per pound of the disinfectants has been furnished by the respective manufacturers. These have been combined with the average inhibiting concentration in parts per million for each test organism to give cost-toxicity data.

The data presented in this series of papers show the futility of selecting a disinfectant solely upon a cost basis. However, it would be uneconomical to disregard cost and to select a disinfectant solely upon a toxicity basis. The most effective and economical use of disinfectants can be made by using cost-toxicity data.

The application of cost-toxicity data presupposes a knowledge of the types of organisms to be inhibited. Moldproofing paper and pulp is a good illustration for the application of such data. One of the three test organisms, *Aspergillus niger*, is a mold which is commonly found on moldy paper and pulp. The inhibiting concentrations of each disinfectant for this mold have been determined. When these toxicity data are combined with the cost data, the cost-toxicity data for *Aspergillus niger* result. From these values it is relatively easy to make effective choices for specific cases of moldproofing.

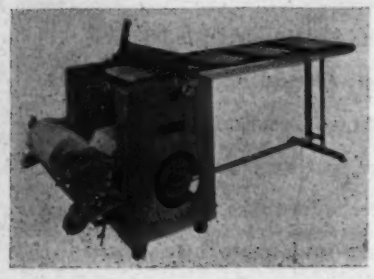
Slime control is another example to which cost-toxicity data may be applied. Slimes differ considerably in composition and appearance. A knowledge of the principal types of organisms in a particular slime becomes necessary in the light of the cost-toxicity data. The dosage and the cost will be dependent upon the types to be inhibited. Since the cost-toxicity data show that *Bacillus mycoides* (a spore-former) can be inhibited most economically, it follows that bacterial slimes which contain chiefly spore-formers would require smaller dosages than bacterial slimes which contain chiefly nonspore-formers such as *Aerobacter aerogenes*. The problem of slime control is unfortunately more complicated than the simple cases just described. One, two, or all three types represented by the three test organisms may be present in paper-mill slime. The important point to note here is that the types of organisms present in the slime as it leaves the mill must be determined if the cost-toxicity data are to be applied most effectively. If facilities are available, the bacteriological examination of slime should be made at the mill. However, in some cases, it is necessary to send the slime sample to a distant laboratory. If this is done, the sample should be properly refrigerated and transported as rapidly as possible in order to minimize the changes in the original microflora. The bacteriological examination of slime is not an easy one, even for an experienced microbiologist. An alternative has been suggested in the preceding paper (Appling, J. W., and McCoy, J. F., *Paper Trade J.* 121, No. 3:37-40, July 19, 1945) namely, the development of a disinfectant which will be sufficiently toxic to every type of micro-organism that it will effectively control every type of slime. Although attempts have been and continue to be made in this direction, no such material is known to the authors.

The committee is anxious to expand the testing program to include all commercially available disinfectants which are being recommended for use in the paper industry. It is willing to determine the inhibiting concentration of any representative sample which a mill may wish to have examined. There are only a few on hand to be tested at present; therefore, more are desired. It was stated in the first paper that the committee would be glad to include such promising new materials as its testing program permitted. If any manufacturer wishes to submit, any new material prior to their release for mill use, he should communicate with the Committee.

NEW EQUIPMENT AND SUPPLIES

Sheeter-Gluer

The Miller Wrapping & Sealing Machine Company, 18 South Clinton St., Chicago 6, Ill., has announced a new sheeter-gluer for the wrapping, banding or bundling of such items as paper napkins, index cards, stationery, printed forms, and other paper goods, as well as irregular or hard-to-wrap packages of many varieties. Designated as Corley-Miller Model BL, this machine supersedes Model SW. The new machine glues, cuts, and delivers sheets of paper or cellophane



from rolls onto a table height conveyor accessible to one or more operators. Speed of sheet delivery is controlled through a variable speed drive. Available in several sizes, the machine can be furnished with an electric eye for printed rolls—also to preseal printed labels or bands to the cut sheets.

Other design features include a welded steel frame, caster mounting for portability, driving gears enclosed in oil and within machine frame, rotary actuation of shear type paper cutting knife as well as of the running glue line mechanism, and distance below sheet conveyor free of obstructions to permit operators to sit facing conveyor with legs below belt level.

Outboard Propulsion Unit for Mill Barges and Boats

Murray & Tregurtha, Quincy, Mass., have announced a heavy duty outboard propulsion unit for mill barges and boats. Designated as the *Harbormaster* and either Diesel or gasoline powered, the unit is made in sizes ranging from 20 hp. to 330 hp. Within the range of these sizes, the unit can be used on any boat or barge that has a stern, or is alterable to allow the submersion of the vertical propelling and steering section. The unit also may be transferred from one craft to another.

Three other features of the Harbormaster are: a 360-deg. propeller thrust steering control, a 80-deg. elevating mechanism, and a shear pin.

By turning the steering wheel, the entire driving and steering assembly turns to any horizontal angle, the complete 360 deg., if so desired.

The 180 degree elevating mechanism allows the operator, either manually or by power, to elevate the entire submerged section, out and backward, to a position directly overhead if desired. Likewise, by angling the submerged propelling and steering section out and backward to any degree up to 45, the unit can function in shallow and reef-filled waters.

The shear pin protects the vertical assembly against damage. This pin, according to the announcement, shears the instant that the vertical assembly strikes an object of sufficient size to cause damage, thus allowing the entire assembly to ride out and backward over the obstacle. A new shear pin can be inserted quickly and without the necessity of throwing out the clutch.

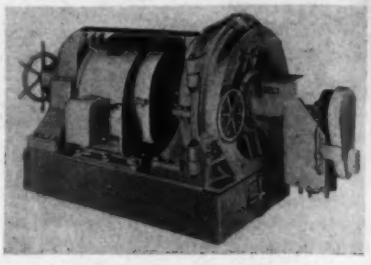
Rotary Disc Refiner

Sprout, Waldron & Co., Muncy, Pa., has announced the 36-2 refiner, a single disc mill, for use on kraft, soda, and sulphite knotter and fine screen rejects; on hogged bull screen rejects; on knotter and second screen rejects of raw groundwood; on semichemical chips of all kinds; on spent chips after extraction processes; on bagasse, straw, and similar grasses; for breaking down lumps in reclaimed waste paper stock; for refining fully-cooked kraft, sulphite, and soda pulps; and for reduction and refining of rag and other half stocks.

In this design of refiner, one set of plates is fixed to the mill shell; another set, to the rotating disc. The plates are cast from a special hard white iron. The stationary swing head is a steel casting. The runner disc is of electric steel.

The casing is provided with a tramming device so that the refining plates on the swing head can be brought into accurate alignment with the rotating plates on the runner head. Changes in characteristics of the finished pulp are secured through selection of plate design, variation in consistence, and disc settings.

Neck retainer bolts allow the plates to separate if tramp metal or other foreign material should gain entrance. Quick and



accurate adjustment is provided through a large handwheel.

The motor, either of open induction or synchronous type, is built in. Ordinarily, the power will range from 100 hp. for light duty up to a maximum of 400 hp.

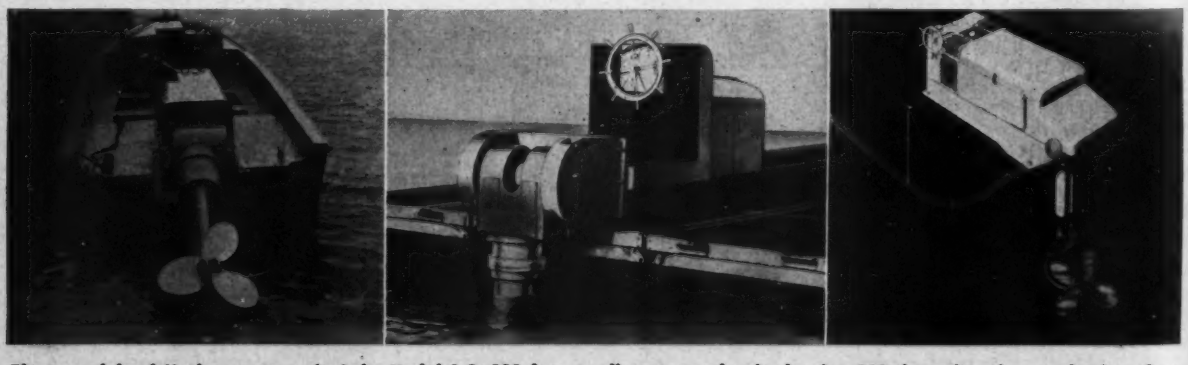
Capacity of the refiner varies with characteristics of stock, size of feed, and characteristics of finished pulp desired. The range, on an air dry rating, is ordinarily from a low of approximately 10 tons to a maximum of about 50 tons per day.

60-Ton Shop Press

A shop press of sixty tons capacity has been announced by Rodgers Hydraulic Inc., Minneapolis, Minn. Features of the press, called the Rodgers Sixty, as cited in the announcement, are fast operation, ruggedness, versatility, and large capacity for work size.

Power is supplied by a 2-speed hydraulic hand pump which, in high speed, moves the ram 2½ in. per pump stroke, giving up to 2,000 lb. pressure in fast travel. Lever on the pump may be quickly flipped for high pressure operation.

The hydraulic cylinder rests on rollers



Three models of Harbormaster unit. Left—Model 0-2, 110 hp. gasoline-powered unit showing 180 deg. elevating mechanism. Center—Model 0-6, 165 hp. Diesel. Mounted on utility pontoon barge. Right—Model 0-41, 40 hp. gasoline

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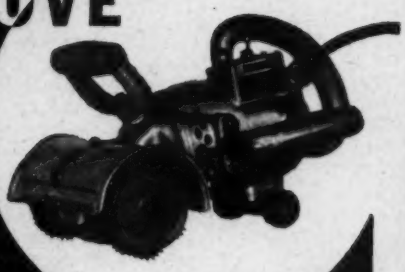

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which ride the flanges of the upper bolster and may be moved across the entire working width of the press when desired. Ram travel is a full 13 in. at a continuous stroke.

Flexibility of the press is achieved through adjusting the lower bolster by means of a hand crank. Maximum opening between bolsters is 38 in., minimum is 8 in. A special model with an opening range from 8 in. to 48 in. is available. Although working width between the sides is 45 in., long pieces may be handled through the open sides

The hydraulic pump together with globe valve, and gauge (in tons and pounds) are located on the lower right side of the press for operating convenience.

A machined and matched pair of V-blocks is furnished as standard equipment. Special attachments for ring gear riveting and for aligning and centering shafts, rod, etc., are available, as well as an end support stand (adjustable) for handling long material.

It is claimed that a great variety of general shop operations are easily performed by the Rodgers "Sixty," such as: pressing, straightening, shearing, bending, clamping, riveting, broaching, and assembly work.

Self-Propelling Tractor Saws

Three models of self-propelled tractor saws for tree felling and bucking operations have been announced by the Little Giant Tree Feller Corporation, 202 South Haskell Avenue, Dallas 1, Texas. Two models incorporate circular saw blades of 36 in. and 40 in. respectively. The third model carries a 48 in. chain saw in its design.

The larger of the two circular saw models is powered by a Wisconsin, 4 cylinder, VE-4 engine. A Waukesha Cub Twin engine supplies power to the smaller circular saw model.

The chain saw unit is equipped with a Wisconsin VE-4 air-cooled engine, the speed of which is governor controlled. At normal sawing speeds the engine travels at the rate of 2600 rpm. At this rate cutting speeds of 1 inch per second in average timber have been achieved. A slip-clutch permits the engine to continue to run in case the saw chain is obstructed in making a cut.

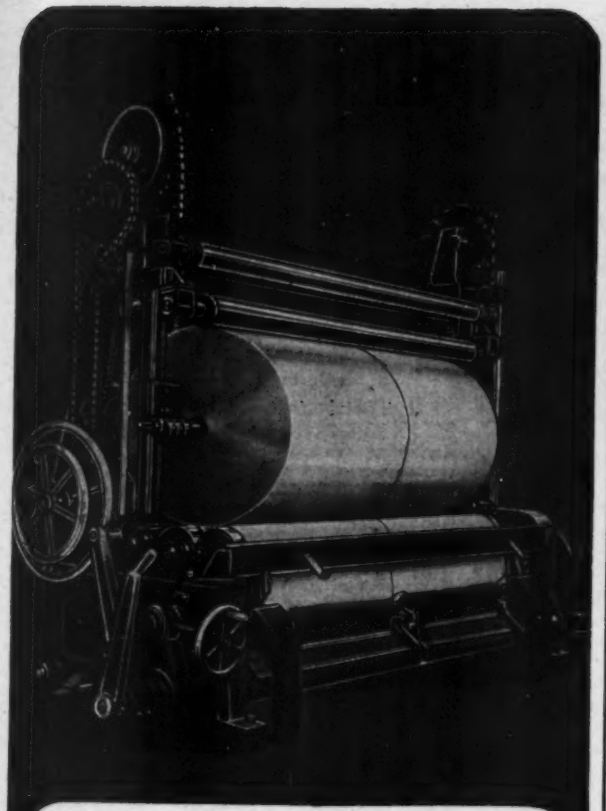
All models have extreme flexibility at the cutting head due to the combination of a head which can be adjusted 360 degrees around the drive shaft, permitting horizontal, vertical or notch cutting; and the elevation control which permits upward and downward adjustment of the saw blade. Trees can be cut down even with the ground for land clearing operations or left with a stump for bulldozing. In addition, the circular and chain saw heads are interchangeable at the transmission in about 30 minutes time.

The self-propelled feature enables these units to travel almost anywhere over any type of terrain on their own power as fast as a man can comfortably walk.

Oil-water Emulsion Breaker

Honan-Crane Corporation, 803 Indianapolis Avenue, Lebanon, Indiana, a subsidiary of Houdaille-Hershey Corporation, has made arrangements for exclusive distributorship of Visco 77, a lubricating oil-water emulsion breaker. This product is a noncorrosive, liquid chemical additive, which, according to the announcement, when added to the most stubborn water emulsion in the amount of 1/10 of one per cent (one gallon of the additive to 1,000 gallons of lubricating oil) and the oil maintained at rest at a temperature of from 180-185 Fahr., will break the emulsion and all water will settle out in from 24 to 48 hrs. The announcement also states that the additive is harmless to any lubricating oil and can be used with safety on any major circulating system where difficulty is experienced in removing water from the lubricating oil.

Product is available in 55-gallon non-returnable steel drums and five-gallon cans.



CAMACHINE 14 operates as the winding unit of paper machines not exceeding 500 F.P.M. paper-making speed and 92" trim width. When used in this capacity, the winder can be operated at speeds up to 1,400 F.P.M. The machine is also used extensively as a re-winder in finishing rooms and paper converting plants.

In board mills this winder is used in connection with the board machines and as a rewinder in the finishing rooms. In such work **CAMACHINE** 14 operates at speeds up to 800 F.P.M. In whatever application it may be used, this unit has all of the notable features found in **CAMACHINES** of greater widths and speeds.

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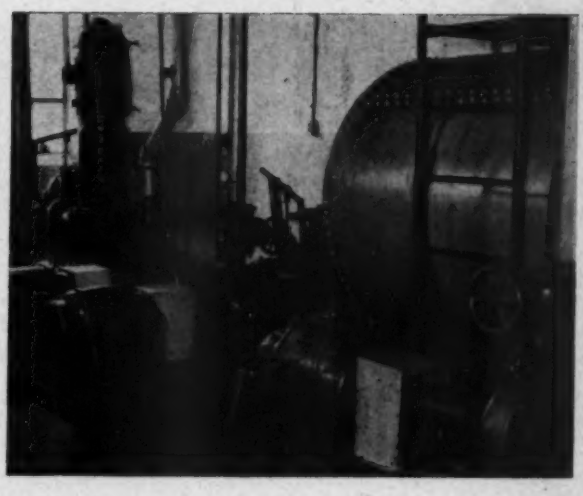

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Pump Fig. No.	*Capacity GPM*	*Liquid Pumped*	*Head*	*Remarks*
3115-6"	1,000	5% Paper Stock	50 Ft.	Vertical Type—Pump in Background
3159-4"		White Water	40 Ft.	10 HP—1150 RPM Motor
3159-4"	800	White Water	55 Ft.	10 HP—1150 RPM Motor
3159-4"	800	White Water		15 HP—1150 RPM Motor
3720-4"L	700	White Water	130 Ft.	30 HP—1750 RPM Motor
3168-3"	50	3% Reclaimed Stock	50 Ft.	Note: Outside Water Seal to Stuffing Box
3159-4"	700	1½% Stock	81 Ft.	Note: Outside Water Seal to Stuffing Box
3390-3"-2Stg.	225	215°F Feed Water	775 Ft.	Boiler feed Service—Motor Drive
3390-4"-2Stg.	420	230°F Feed Water	587 Ft.	Boiler feed Service—Turbine Drive

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

The Effect of Age on Poplar Wood on Its Pulping Properties

The wood taken from three trees of *Populus monilifer* was studied both from the standpoint of age, chemical composition, pulp yield and pulp properties. The tree samples (I), (II) and (III) were respectively 17, 22, and 43 years old, and in each case full data are given regarding site, soil conditions, height of cutting, diameter of log, methods of sampling, etc. By relatively mild chloriting techniques each sample was converted into holocellulose (and these residues were corrected for residual lignin), the yields being 80.1, 76.7, and 74.9% for I, II and III respectively. The corresponding per cent lignin of the three wood samples were 19.3%, 22.1% and 24.3%. On the original dry wood basis, the total percentage of pentosans, alpha-cellulose, and alpha-cellulose corrected for hemicelluloses were respectively as follows: For I, 15.9, 51.8 and 49.9; for II, 16.8, 47.0, and 46.1; for III, 17.1, 44.7 and 43.6%. Thus the lignin content of this wood increases with age, as does the pentosan content, whereas the holocellulose and the alpha-cellulose both decrease with the age of the wood.

When these three woods were cooked by the kraft process under identical conditions, the pulp yields (free from screenings) were respectively 56.3, 54.4 and 52.8% for I, II, and III. These are unusually high yields, and complete analyses of the three pulps are given. Similarly full data are given regarding brightness, breaking length, elongation, tear, burst and folding endurance (both at 50° and 65° S. R.). The brightness was highest in the pulp from I and lowest in that from III. However, strength properties of the pulps could not be correlated with age. Thus the highest breaking length, burst and fold were noted in the case of the pulp from II. On the other hand the "overall quality number" (Cf. Chemical Abstracts 37,767) was slightly higher in the case of pulp I (due largely to its greater brightness). Regularly the weakest and dullest pulp was that from III. The authors also refer to other work (not yet published in Aug., 1944) in which three hybrid poplars—*P. robusta* (IV), *P. marylandica* (V) and *P. canadensis* (VI) were also examined as possible pulpwoods.

All of these samples were taken from young trees (9-12 years old). Alpha cellulose determinations (on holocellulose preparations by extracting under nitrogen with 10% alkali) varied from about 44-45%. These three woods gave almost identical sulphate pulp yields (54% ± 0.3%) and these pulps retained practically all the alpha-cellulose originally present (about 43% on the basis of the wood). In general the pulp quality was unusually high. Tested by the official German methods, the maximum values found were: breaking length, 11,310 meters; tear, 215 cm.g/cm.; folding endurance, 11,000; burst, 6.73 kg./sq. cm. In certain cases the strength quality numbers exceeded those found for I, II, or III. The authors again emphasize the fact that young hybrid poplar wood is a good papermaking raw material, and that its pulps in some properties approach those of spruce sulphate, especially when the age of the wood is 12 years or less. 14 references are given. G. Jayme, and F. Reh. Cellulosechemie 22, No. 3, 65-72 (1944).

Extractives in Poplar Wood and In Chemical Pulps From Poplar

Because it contained the highest extractives yield of any hybrid poplar examined, the authors chose the wood of a 12 year old *Populus serotina*. The wood contained a total of about 3.145% (ether and methanol) extractives. Of these, 0.645% was ether-soluble and 2.5% methanol-soluble. When the ether-soluble portion was fractionated it gave 0.037% unsaponifiable matter, 0.436% glycerol and water solubles, and 0.172% saponifiables (largely resin and fatty acids with the latter predominating). The methanol-soluble fraction gave 2.39% water insoluble matter (possibly phlobaphenes) and 11% material soluble in water. When this poplar was cooked by the usual sulphite process, about 84% of the extractives originally present was removed.

This pulp was treated to several different three-stage bleaches. In one case the first stage involved the use of 2.8% free chlorine at 3% stock density, for 1 hour. The second stage consisted of a treatment with 2% caustic soda and 0.3% sodium oleate, at 15% stock density, and 70 deg. for two hours. The final stage was a calcium hypochlorite bleach containing 0.5% active chlorine at 35 degrees and 5% stock density, followed by brief treatment with sulphur dioxide. The bleached pulp yield was 47.7% (based on the original wood). Other slightly different bleaching conditions gave very nearly the same pulp yields.

The bleached pulp (prepared by the method described) still retained a total extractive content of 0.60%; however, of this 83% was ether-soluble. This indicates the remarkable tenacity with which the ether-solubles of the original wood persist even in carefully bleached sulphite pulp. On the other hand the extractive content of this pulp was within the range usually found for commercial spruce sulphite dissolving pulps. The brightness of the unbleached poplar pulp was 70; that of the bleached sulphite pulp was over 92%. A typical kraft cook was also made and the screened pulp yield in this case was 54.1% with 42% brightness. Three-stage bleaching of the kraft pulp (by a method very similar to the one described above) gave a final yield of about 50.8% (based on the original wood) with a brightness range of 86-90%. The percentage of extractives in the unbleached kraft was 1.03% of which 56% was ether-soluble. In the bleached kraft the per cent had dropped to 0.58% of which 71% was ether soluble. Here again the ether-soluble extractives persisted although to a lesser degree than in sulphite pulp. In either case the brightness was higher than in commercial dissolving pulps.

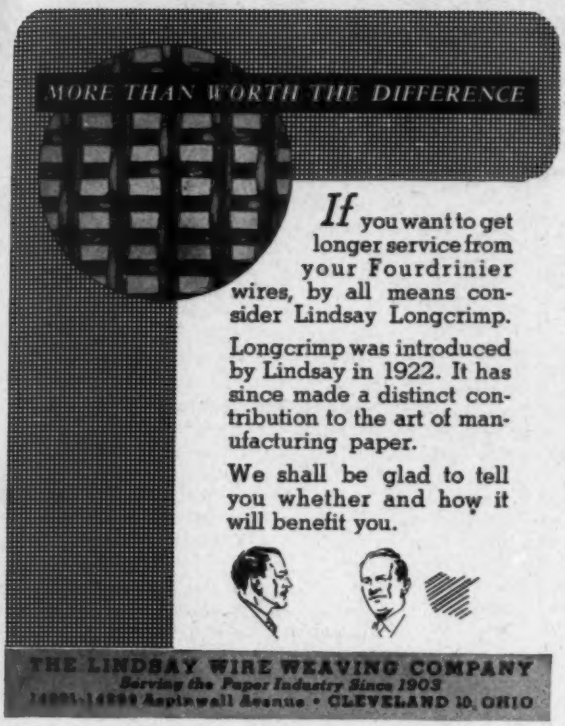
The relative ease of bleaching these pulps may be due to the fact that the lignin is less highly polymerized and that the resultant chlorolignin is more readily removed. The authors emphasize the advantages in using black poplar wood over the commonly used European beech as raw material for pulping. Its rapid growth, morphology, high cellulose content with surprisingly low pentosan retention commend its use. Its one disadvantage is its higher fat content, which is in part retained after pulping and even after bleaching. However, this is not too great to militate against the advantages of the wood. G. Jayme and L. Rothamel. Cellulosechemie 22, No. 3, 88-96 (1944).

Pulp Preforms

Detailed outlines are given of the manufacture of resin-containing pulp preforms. The chosen fiber is cooked under low pressure with caustic soda to remove the readily soluble components. Any lignin present is an asset, and cleanliness is not a requisite. After the cook, the pulp is "seasoned" for a few days, and then washed well with warm water. After beating for three hours, a phenolic-resin-emulsion is added, then sodium aluminate to precipitate the resin, and finally (one-half hour before dumping the beater charge) papermakers alum is added to bring the pH to 4.6 to 5.0.

The stock in the tanks must be agitated effectively and is fed by centrifugal pumps to measuring tanks connected with vacuum-forming tanks or with overhead vacuum-forming gear. The preform is made in the usual manner on wire gauze, and is then dried in a current of warm air in some form of tunnel dryer. In the vacuum formation of the preforms, pressing is first done at low vacuum, which is then increased gradually. Pressing with heated fluid pressure on vacuum tools, removes a greater quantity of water and causes a slight flow in the resin. Unless some finishing method is applied before the final hot pressing, it is hard to obtain moldings of uniform color.

By dipping the preform in an emulsion, a surface of high resin content may be obtained. Care must be taken that the resin does not form a skin on the surface and trap moisture within it. Certain articles can be sprayed afterwards with a baking finish and dried by using infrared heat. H. C. Martin. Plastics (London) 8, 520-29 (1944); Tech. Bull. Paper Makers' Assoc. Gt. Britain and Ireland 21, No. 10-2, 52-3 (1944); 22, No. 1-3, 2 and 3 (1945) through B.I.P.C. 16, 190-1 (1946).



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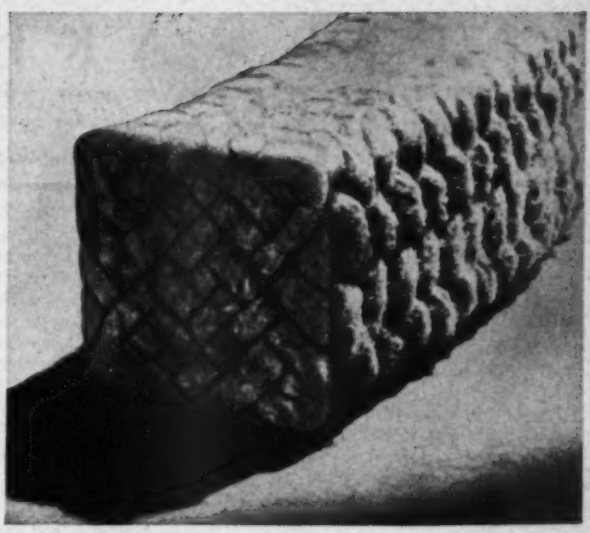

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Lattice-Braid
PACKING

PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Apparatus for Controlling the Coating of Paper

Patent No. 2,365,621. Robert W. Bender, Kansas City, Mo., assignor to Waxide Paper Company, Kansas City, Mo., a corporation of Missouri. Application August 3, 1940. Serial No. 350,851. 5 Claims. (Cl. 91—31).

5. An apparatus of the character described comprising means for applying a coating and/or impregnating medium to paper including a pair of rollers adapted to have the paper passed therebetween, means for applying pressure to one of said rollers relative to the other for fixing predetermined portions of the coating medium in and on said paper including a pair of standards, aligned bearings in said standards supporting the ends of said rollers, piston cylinders mounted on said standards having pistons engageable with the ends of one of said rollers for exerting forces against said roller in the direction of the other roller, a fluid pressure line leading to said cylinders, means for feeding said fluid pressure line with sufficient pressure medium to exert suitable forces, and a valve for controlling supply and exhaust from said line relative to said line feeding means.

Papermaking Machine

Patent No. 2,367,778. Lloyd Hornbostel, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application November 30, 1942. Serial No. 467,343. 16 Claims. (Cl. 92—49).

11. A press section and couch roll assembly for a paper machine comprising a horizontal top frame, a couch roll frame supporting one end of said top frame, and a vertically movable press roll suspended from said top frame adapted to lift the top frame to relieve the load on the couch roll frame for a wire-changing operation.

Manufacture of Sulphite Pulp

Patent No. 2,377,282. George H. Tomlinson, Westmount, Quebec, Canada. Original application January 26, 1938, Serial No. 186,938. Divided and this application August 14, 1940, Serial No. 352,507. 7 Claims. (Cl. 23—262).

1. Apparatus for the recovery of chemicals in a dry condition and heat from waste liquor containing inorganic chemicals and combustible organic matter comprising in combination walls defining a furnace chamber having a normally closed bottom section devoid of smelt outlets and a gas outlet in the upper part thereof, means for introducing and spraying the waste liquor into said furnace chamber, said furnace chamber and spraying means being constructed and arranged for burning the waste liquor in suspension therein while passing towards said gas outlet to yield combustion gases and a dry chemical ash in suspension, means for controlling the atmosphere in said furnace chamber including an air inlet adjacent said spraying means and an air inlet adjacent said furnace chamber bottom and arranged to sweep up ash from said furnace chamber bottom, whereby the combustion gases leaving said gas outlet contain in suspension substantially all of the chemical ash produced in said furnace chamber, an unobstructed vertical downflow gas passage for ash-laden combustion gasses joined to said furnace chamber by said gas outlet, and the effective gas flow area of said vertical gas passage being constructed and relatively proportioned to provide a gas velocity therein sufficient to maintain said chemical ash in suspension in said combustion gases.

Baryta Coating of Melt-Coated Paper

Patent No. 2,366,723. Hollis T. Galley, Rochester, N. Y., assignor to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey. Application February 13, 1941, Serial No. 378,769. 7 Claims. (Cl. 95—8).

1. A photographic paper which comprises a paper which has been waterproofed by applying a melt-coating thereto essentially consisting of a low viscosity cellulose acetate butyrate and a plasticizer, followed by a baryta coating from a composition essentially consisting of blanc fixe, a binder, water and an organic solvent present in sufficient amount to soften the surface of the melt-coating without dissolving it and a silver halide photographic emulsion applied directly to the baryta coating.

Couch Roll Arrangement for Paper Machines

Patent No. 2,369,674. Lloyd Hornbostel, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application May 13, 1942. Serial No. 442,755. 3 Claims. (Cl. 92—44).

1. A Fourdrinier type paper making machine comprising a breast roll, a first wire roll in spaced lateral relation therefrom, a couch roll beyond the wire roll at a level below the top of the wire roll, said couch roll including a foraminous cylinder and a suction gland in the cylinder having spaced opposed on-coming and off-going seals acting on the cylinder to define a suction area, a second wire roll beyond the couch roll at a level beneath the top of the couch roll, a looped forming wire around all of said rolls and having an upper run extending substantially horizontally from the breast roll to the first wire roll and then sloping downwardly to the second wire roll, said first wire roll guiding the wire onto the cylinder of the couch roll in advance of the suction area, said second wire roll directing the wire off of the cylinder at the off-going seal before suction in the holes of the cylinder is completely broken, a save-all trough in the loop of the wire receiving the cylinder therein, said trough having a first wall extending between the cylinder and the first wire roll into closely spaced relation with said forming wire together with a second wall extending between the cylinder and second wire roll into closely spaced relation with the forming wire, and a stripping roll for stripping a web of paper from the forming wire as soon as the suction effect on the web is broken by removal of the wire from the cylinder.

Paper Manufacture

Patent No. 2,378,113. Charles R. Van de Carr, Jr., Chillicothe, Ohio, assignor, by mesne assignments, to K-C-M Company, Dayton, Ohio, a corporation of Delaware. Application March 21, 1938, Serial No. 197,168. 4 Claims. (Cl. 92—40).

1. A method of manufacturing a mineral surfaced paper web, of the character described, suitable to receive printed impressions; which consists in forming the web structure on a paper making machine to have desired predetermined characteristics of responsiveness to consolidation when subjected to rolling pressure, partially drying the traveling formed web to bring the moisture content thereof down to and within the range of approximately 38%-4%, subjecting the traveling partially dried web to predetermined consolidating pressure effective through the whole of the web and sufficient to break down looseness of formation of the web and to effect predetermined retained consolidation thereof extending through the whole of the web structure but not sufficient to exceed the inherent resiliency of said web structure, said consolidating pressure being effective also to effect predetermined smoothing of the surface of the web, then applying mineral surfacing material to said consolidated web and maintaining said consolidated web structure under controlled pressure during the applying of the mineral surfacing material thereto to provide a smooth applied coat, then drying the coated web, and subjecting the mineral surfaced web to a supercalendering operation and thereby supercalendering the mineral surfaced paper web, to give a smooth printing surface.

Protein Product and Process for Making Same

Patent No. 2,370,266. Allan K. Smith, Herbert J. Max, and Donald H. Wheeler, Urbana, Ill., assignors to Claude R. Wickard, as Secretary of Agriculture of the United States of America, and his successors in office. No Drawing. Application July 29, 1941. Serial No. 404,530. 8 Claims. (Cl. 117—156). (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757).

1. A paper coated with a composition comprising an alkali dispersion of clay and a refined protein material treated with a dithionite salt.

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New Catalogues and Publications

American Cyanamid Company, Calco Chemical Div., Bound Brook, N. J.—Now available is Bulletin No. 770 entitled "Microscopical Techniques for the Study of Dyeing." The text is supported by descriptive illustrations of equipment now in use and covers the various techniques in the preparation of microscopical cross-sections. Also described are the methods of color photomicrography, illustrated with color plates. Copies may be obtained from your Calco representative or by request addressed to the company's advertising department.

Automatic Transportation Company, 149 W. 87th St., Chicago 20, Ill.—A booklet illustrating uses and specifications of their new Transtractor, a push-pull unit combining the features of the electric propelled hand truck and the warehouse tractor, has just been published by this company. The six-page bulletin gives complete data concerning the construction, drive unit, motor, braking system, drive control and steering mechanism of this equipment. Another bulletin just issued by the same company describes the Automatic Selenium battery charger, a plug-in unit which recharges Transporter and Transtractor Batteries during off hours. Both bulletins are available to industries with materials handling problems upon request.

Blaw-Knox Company, Power Piping Division, Pittsburgh, Pa.—Details of the Supertherm System of process heating, which uses superheated water, are described in a booklet just issued by this company. This type of high pressure hot water heating lends itself particularly to the manufacture of wall paper. Booklets may be obtained by writing the company at 1525 Pennsylvania Ave., Pittsburgh 12, Pa.

General Electric Company, Chemical Department, Pittsfield, Mass.—Just issued by this company is a twenty-four-page blooklet on G-E mycalex, a stone-like product composed of mica and a special glass. This illustrated bulletin describes in detail both the technical and manufacturing data compiled by General Electric in its twenty-three years of mycalex production. Available types, molded parts, fabricated parts, machining practice and information are included as well as properties chart.

The B. F. Goodrich Company, Akron, Ohio—In the new ten-page Catalogue Section on industrial protective clothing published by this company, will be found heavy duty models for workers in chemical fields. Among these are a vinyl-resin industrial coat that cannot be stained by oil and grease; plastic coated acid-proof aprons; industrial rubber gloves and industrial rubber footwear. Ask for Bulletin No. 12000 2-46. Also available upon request is a new publication, "Guide to the Selection of Conveyor Belt Grades." It discusses the differences in various grades; outlines the reliable measurements of qualities in various type belts and the services for which they are commonly applied. Descriptions and data are contained in the guide, as well as the ordinary uses for each grade and also for special constructions.

Graton & Knight Company, 356 Franklin St., Worcester 4, Mass.—Recently published by this company is a three hundred and thirty-six page manual on the selection of mechanical packings types, their application and the design of adjacent parts in hydraulic or pneumatic equipment. The manual is intended primarily to outline the basic principles which influence packings life and resultant machine performance. Both leather and synthetic rubber packings are discussed, together with operating conditions governing the selection of material. Included in the illustrations are over one hundred drawings of packings design and application, also many photos of successful installations, causes of packings failures and their remedies, etc. Time-consuming calculations will be saved by nearly fifty reference tables. The book is adequately indexed. Price—$4.50. Orders should be sent to the above address.

Hewitt-Robins, Inc., Buffalo, N. Y.—Just published by this company is a new belting catalogue, designed to aid industrial plants and maintenance men in the selection of the right equipment for the job. It is written in non-technical terms. The two-color loose leaf publication includes specifications on conveyor, transmission and elevator belting, as well as suggestions for prolonging the life of belts and avoiding production delays. Plant photographs illustrate uses for these belts, while the belt construction is shown by sectional drawings. Copies may be obtained by writing Hewitt-Robins, Inc., at the above address, or from local dealers.

Illinois Electric Porcelain Company, Macomb, Ill.—Filled with helpful information for purchasers of porcelain pipe for handling of chemicals and acids is Catalogue C-2, brought out by this company. Photographs, cutaway views, diagrams and tables are used plentifully.

Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.—Just announced by this company is a two-color, sixteen-page bulletin, entitled "The Shaft-Seal—The Answer to Your Stuffing Box Problems." This booklet will be of the greatest interest to users of centrifugal pumps, particularly in the chemical industries. In addition to cross-sections, "exploded views" and pictures of typical installations, there are performance records for a number of liquids. Copies of this bulletin may be obtained by writing for Form 7100 to the above address or any branch office.

Jessop Steel Company, Washington, Pa.—Information on the cast-to-shape steels manufactured by this company is contained in a booklet now available. Photos and descriptive material, as well as comparative hardness table and a temperature conversion table, make this an informative catalogue for purchasers of tool steel.

Marco Company, Wilmington, Del.—An attractive booklet available from this company describes and illustrates their line of Flowmaster processing equipment, which will be of interest to the paper industry for stock agitation, transparent wrappings, coatings, cellophane, etc. Photos and diagrams explain the operation of the machinery.

Orton Crane & Shovel Company, 608 S. Dearborn St., Chicago 5, Ill.—A new sixteen-page catalogue describing their standard and broad gauge Diesel and gasoline locomotive cranes is now available. The booklet contains valuable information for those with materials handling problems requiring use of a locomotive crane. The construction and engineering details are liberally illustrated and explained. Three separate charts give data concerning clearance dimensions of standard gauge models, weights of rehandling and excavating clamshell buckets loaded with various loose materials and normal lifting capacities of all models at operating radius of 10 to 120 feet. Ask for Catalogue No. 77. Also available is a sixteen-page catalogue showing the one-man Aero-Crane made by this company. Tables show general dimensions of the seven models, and their normal working capacities at an operating radius of 9 to 50 feet. Another table lists weights of rehandling and excavating clamshell buckets loaded with various kinds of loose materials. Ask for Catalogue No. 73.

Photovolt Corporation, 95 Madison Ave., New York 16, N. Y.—A descriptive folder on their new Lumetron Photoelectric Colorimeter, particularly designed for color and turbidity measurements of water and for chemical water anaylsis may now be had from this company. Charts and diagrams add to the effectiveness of the reading matter.

Raytheon Manufacturing Company, Industrial Electronics Division, Waltham, Mass.—A bulletin now available on the new Dielectric Heater made by this company will be of interest to the paper industry, where it has countless applications, including paper drying, setting and/or drying of impregnated paper, etc. A helpful table of specifications is included in the bulletin.

Robins Conveyors, Inc. (Division Hewitt Rubber Corporation), Passaic, N. J.—Of interest to foundry operators will be Bulletin No. 124-F, describing their portable shakeout with automatic flask loader.

Spray Engineering Company, 114 Central St., Somverville, Mass.—An interesting circular, complete with photos, diagrammatic sketches and tables, has been published by this company to describe their battery spray moistening equipment. This type of equipment is being used successfully for various purposes in paper mills. An important feature of the booklet is a questionnaire listing information necessary for recommendation and quotation on this equipment for use in paper mills.

Herman H. Sticht Company, Inc., 27 Park Place, New York 7, N. Y.—A leaflet listing bulletins descriptive of their various types of tachometers is available from this company. Ask for Bulletin No. 1045.

United Electric Controls Company, 69-71 A Street, Boston 27, Mass.—Just issued by this company is a "Condensed Catalogue and Price Sheet," descriptive of their line of thermostats and pressure switches. Ask for No. 4591-C. The circular is well illustrated.

Worthington Pump and Machinery Corporation, Harrison, N. J.—The company's Vertical Turbine Pump Division has just issued Bulletin H-450—B-33, "Worthington Vertical Turbine Pumps—Typical Applications." There are a number of cross-sectional drawings and illustrations. This bulletin is available upon request.

Books

The Blue Book of Southern Progress (1945)—An annual, this paper-covered statistical reference volume highlights the economic aspects of the following states (and the District of Columbia): Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. Facts and figures cover manufacturing, minerals, forestry, power, agriculture, transportation, construction, banking and finance, foreign trade and area and population. The book also contains a list of state officials and important commissions as well as a list of institutions of higher education, both arranged alphabetically by states. Published by Manufacturers Record, 109 Market Place, Baltimore 3, Md., the book is priced at $2.00 a copy.

Factors Contributing to Sulphite Pulp Cleanliness—This paper-covered book, issued in limited edition, has been re-

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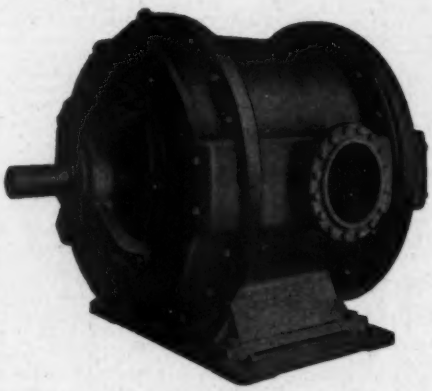

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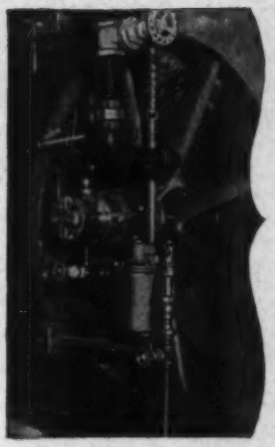
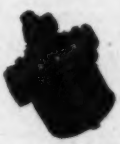
STICKLE
OPEN FLOAT TRAPS
for Individual Dryer Drainage Systems and All Other Paper Mill Drainage Needs



Series T, Low Pressure

Series T, Vacuum Service



Series AE, High Pressure

Series 100, High Pressure

The development and perfection of Stickle Open Float Traps came in connection with solving drainage problems in paper manufacturing.

Positive Operating Principle

The Stickle Open Float principle affords simple, natural and positive operation. The open bucket, or float operates without friction, acting instantaneously in opening and closing valve. No steam escapes into discharge line.

Large Air Handling Capacities

Internal by-pass eliminates all air and gases with each discharge. Open Float cannot rise and close valve until air and water cease to flow in constant stream from trap.

Lasting Construction

Stickle Traps have no levers, hinges or other complicated internal mechanism. Bucket and valve rotate with discharge giving continuous regrind to valve and seat to maintain smooth surfaces and accurate fit. No scoring. No wiredrawing.

For All Drainage Requirements

Produced in series designs and sizes to meet specific operating conditions and for all working pressures.

BULLETINS

Bulletin No. 415 for Series T Low Pressure and Vacuum Service Traps. Bulletin No. 315 for Series AE Medium and High Pressure Traps of larger capacities. Bulletin No. 115 for Series 100 Traps of smaller capacities for medium and high pressures and for straight-in-line installation.

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● Complete Stickle Drainage and Control Systems for paper mills are composed of synchronized Stickle units combined to achieve complete efficiency under specific operating conditions. Overall results are marked reduction in steam costs, increased production and improved quality of product. In a complete system drainage requirements are met with traps for individual dryers or with Stickle Differential Drainage as indicated by given operating conditions. Ask for Bulletin No. 160 for complete information.

Complete STICKLE DRAINAGE and CONTROL Systems

leased by the Technical Section of the Canadian Pulp and Paper Association. Published as a condensation of three reports previously issued by the Sulphite Committee of the Technical Section of the Association, the volume is dividend into three major sections. The first section bears the title Control of Dirt in Sulphite Pulp as Practiced in Canadian and Newfoundland Mills; the second, Sulphite Flat Screen Operation; and the third, Sulphite Woodroom Equipment Practice.

The first section deals with the factors affecting sulphite pulp cleanliness, including wood handling and preparation, acid making, cooking, and washing and screening, as well as pipe line material, slime control, etc. It includes detailed information from 35 Canadian and Newfoundland sulphite mills.

The second section presents information supplied by 22 mills and seven manufacturers of flat screen and flat screen accessories. The information covered includes design of flat screen and screen plates, arrangements of screens, operating details, maintenance, power consumption, etc.

The third section deals with the cleaning and preparation of wood for use in the sulphite digester house. Data on barkers, rossers, knot saws, knot borers, woodpeckers, chippers and chip screens are given. This information was correlated from material supplied by 39 mills.

In addition to these major sections of the book, there are four appendices —Wood Cleaning versus Pulp Cleanliness, a report by T. R. Moore; The Waterous Friction Log Barker, a report on the operation of this equipment; The Allis-Chalmers Streambarker, a report on this barker from its manufacturer; and The Ingersoll-Rand Hydraulic Barker, a progress report by its manufacturer.

The book is priced at $5.00 a copy in Canada and the United States ($6.00 a copy elsewhere). The address of the publisher is Technical Section, Canadian Pulp and Paper Association, 3420 University Street, Montreal 2, P. Q.

How to Evaluate Supervisory Jobs—Written by Albert N. Gillett, this book is purposed to measure in relative terms the requirements and demands of supervisory and executive positions, as well as the individuals occupying and administering the duties and functions of such positions. It is a loose-leaf volume of 141 pages, page size 8½ in. by 11 in.; in gold-stamped fabrikoid binder.

The text material is presented in three sections. Part I explains and describes the Job-Analysis-Rating — Evaluation of Supervision method. Part II is devoted to a detailed description of a definite plan by which management can determine the weak and strong points of the individual occupying the supervisory position. Part III supplies a working kit of blank forms for running tests, 22 forms in all and applicable to both plant and office personnel. Included are typical forms to demonstrate actual job evaluation — actual job performance appraisal forms completely filled out as well as numerous detailed instruction sheets and illustrated charts.

The publisher is National Foremen's Institute, Inc., Deep River, Connecticut; the price, $7.50 a copy f.o.b. shipping point.

Instruments and Process Control—This monograph, prepared in the Curriculum Laboratory at Cornell University in co-operation with the Taylor Instrument Companies, is a loose-leaf plastic bound volume of 233 pages. The text treats of the importance of measurement to control, defines terms, and presents the theory of basic control. Then, it takes up simple controllers, basic controller mechanisms, pneumatic mechanisms incorporating control effects and the control valve and valve positioner.

A very extensive portion of the text next covers industrial controller applications; specialized forms of controllers; specialized controller applications; controller applications on fractionating columns, heat exchangers and in industrial air-conditioning; controller installation and adjustments, and general checking and testing procedures. The book is concluded with a glossary of terms and some data on advanced control theory.

In the preparation of this manual, the following instrument manufacturers furnished illustrations and other data: The Bristol Company, Brown Instrument Company, The Foxboro Company, Fisher Governor Company, Fulton Sylphon Company, Mason-Neilan Regulator Company, Moore Products Company, C. J. Tagliabue Company, and Taylor Instrument Companies.

Priced at $2.75 a copy, the manual is sold and distributed by Delmar Publishers, 49 Sheridan Avenue, Albany 6, New York.

Papermaking in America (A Pictorial Account)—Published by the Buikley, Dunton Organization, 295 Madison Avenue, New York 17, New York, this book is presented as a companion volume to A Pictorial History of Paper which was published last year by the same organization. The book is by Stephen Goerl and contains 22 full page scratch-board drawings by Robert Greco. The text and illustrations highlight some of the most interesting scenes and episodes in the development of the industry. An illustration, revealing one of the three famous Rittenhouse watermarks, depicts the birth of American papermaking. Another picture dramatizes Benjamin Frankin's visit to the Ivy Mill of Thomas Willcox. George Washington trying his skill at the vat in the Onderdonk mill also is portrayed, as is the founding of the Crane mill, oldest in the United States in continuous operation. The remaining pictures and descriptive material are equally dramatic.

It is stated in the preface that every effort was made to portray characters, buildings, equipment and surroundings as authentically as possible. Credit also is given to Dard Hunter, eminent paper historian and curator of the Paper Musuem of the Massachusetts Institute of Technology, for his inspiration, counsel and assistance in the conducting of research and in checking the authenticity of the material.

Safety Training Digest (Industrial Rehabilitation) — A paper-covered, pocket-sized publication, this digest highlights some of the features of industrial rehabilitation programs in selected industries through a series of articles by representatives of these industries. The subjects and authors of the articles follow: Rehabilitation Activities in Selected Industries, John V. Grimaldi; When the Veteran Returns to Ford; Rehabilitation of the Returning Veteran, George A. Paul, M. D.; The Foreman's Place in Rehabilitating Veterans, B. G. Parker; The Use of Tests in Improving Personnel Procedures, Orlo L. Crissey, Ph.D.; The Handicapped Are No Hazard, L. H. Fowler; The Employment of Epileptics; The Peoria Plan, Captain J. Haberle; International Harvester Re-employment Plan; The Army-Navy Program, George C. Wigle; Insurance and the Disabled Worker, Ray Murphy; Disabled Veterans for Factory Jobs, James L. McKinley; Bulova School for the Disabled, Arde Bulova; The Consolidated Vultee Program, A. C. Dick, M. D.; Congressional Committee Hearings on Aid to the Physically handicapped, The American Legion National Rehabilitation Service, T. O. Kraabel; Rehabilitation at Caterpiller Tractor Company; Prime Considerations for an Industrial Rehabilitation Program, John X. Grimaldi; and Rehabilitation Terms Defined, Charles C. Hawkins, Ph.D. Priced at 35 cents a copy, the publication is available through the Center for Safety Education, New York University, 8 Fifth Avenue, New York 11, N. Y.

Sales Compensation Plans—This pamphlet contains seven papers that were presented at the Marketing Conference of the Amerian Management Association. The papers and authors follow: The Development of Salesmen's Standards of Performance, A. L. Nickerson; Compensation and Unionization, Philip Salisbury; The Forgotten Man in Compensation Planning, Robert A. Jenkins; The John B. Stetson Plan, Arthur N. Hosking, Jr.; The Tremco Plan, Ronald Brown; Increasing Sales of Profitable Items, Harry R. Chapman; and Sealing the Salesman's Security, Joseph D. Ardleigh. The publication, totaling 40 pages, is priced at 50 cents a copy by American Management Association, 330 West 42nd Street, New York 18, N. Y., the publisher.

Stock Preparation Monograph I—Prepared by the Stock Preparation Sub-Committee of the Board Committee, Technical Section, Canadian Pulp and Paper Association, this paper-covered publication furnishes information on the characteristics and efficiencies of various kinds of old and new stock preparation equipment. The report is based on a program of plant scale research in which equipment in regular use in a number of paperboard mills was studied.

The monograph covers the experimental procedure; equipment used in board liner stock studies; comparison of effects produced by beaters, a pulper, refiners and jordans; observations on a refiner; observations on a pulper; characteristics of a jordan; and a bibliography on preparation of stock from waste paper. The text is illustrated with 25 graphs, 14 tables, and some 40-odd photomicrographs. Priced at $3.00 a copy, the monograph is published by the Technical Section, Canadian Pulp and Paper Association, 3420 University Street, Montreal 2, P. Q., Canada.

Wood Products for Fertilizer—A paper-covered booklet of 72 pages, this publication covers a report of conference of the Northeastern Wood Utilization Council in co-operation with the University of Maine that was held at Orono, Maine, on June 29, 1945. The publication contains the full text of papers presented at the conference and a summary of the discussion. The titles of the papers and their respective authors follow: Fertilizer Requirements of the Northeast, J. A. Chucka, Maine Agricultural Experiment Station; The Value of Wood Ashes as Fertilizer, Herbert A. Lunt, Connecticut Agricultural Experiment Station; The Use of Lignin in Potato Fertilizer, Stuart Dunn, New Hampshire Agricultural Experiment Station—J. Seiberlich and D. S. Eppelsheimer, New Hampshire Engineering Experiment Station; The Use of Sawdust, Shavings and Superphosphate with Dairy Manure, A. R. Midgley, Vermont Agricultural Experiment Station; Comparisons of Sawdust and Wheat Straw for Bedding, J. W. White, Pennsylvania State College; Action of Soil Bacteria on Wood Products, Charles Thom, formerly Principal Micologist, U. S. Department of Agriculture; Fundamentals of Lignin Chemistry as Applied to Fertilizer, Joseph Seiberlich, Engineering Experiment Station, University of New Hampshire; and Research on Lignin as a Soil Builder, Robert S. Aries, Field Director, Northeastern Wood Utilization Council. Published by the Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn., the booklet is priced at $1.00 a copy.

Murco IMPROVED FLAT SCREEN

ALL PARTS IN CONTACT WITH PAPER STOCK *are* STAINLESS STEEL

VAT BOX MAY BE USED FOR RAPID CHANGE OF SCREEN PLATES AND WASHING OUT....

Illustrating new box side Patent applied for

For use on either Fourdrinier or Cylinder machines this new improved screen is particularly adaptable for running different colors and grades of paper and boards—any operation where cleaning and preparing the screen for the next run demands no loss of time. Some of its special features are the Patented diaphragm stabilizer, tilt feature of Vat that saves labor and assures thorough cleaning of entire screen, low maintenance of drive, efficient and quiet operation of screen in its entirety, high production and low HP requirements. It is made of non-corrosive material at all places where metal is in direct contact with stock that has acid conditions.

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COLORS . . .
for Board and Paper

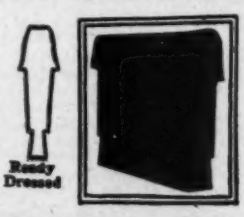
Green Chromium Oxides
Black, Brown, Red, Yellow Iron Oxides
Lamp Black—Umbers—Venetian Reds—Yellow Ochres

C. K. WILLIAMS & CO.
Easton, Pennsylvania

"READY DRESSED" MILL COGS

LABOR SAVING—TIME SAVING

The Most Economical Filling That Can Be Put in a Mortise Wheel.



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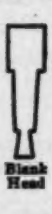

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THE H. P. BOWSHER CO., South Bend, Ind.

Peerless
Vertical Centrifugal
Pumps
FOR SHALLOW LIFTS

Close Coupled Type

PEERLESS PUMPS

100 to 5000 g. p. m.

•

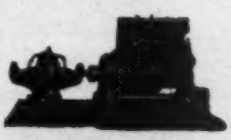
15 to 100 foot head

PEERLESS Vertical Centrifugal Pumps are intended for general pumping purposes.

They are built in both the Close-Coupled and Submerged types. The Submerged type is furnished with either top or bottom suction. Direct connected electric motor, steam turbine or engine drive, either direct or through right angle gear.

These pumps are successfully applied to sumps or drainage or wherever it is necessary to move large quantities of water at comparatively low lift.

Installation space is reduced to a minimum, of paramount importance in most industrial installations.



Peerless Horizontal Pumps

General service horizontal centrifugal pump, arranged for engine drive. Sizes: 8" to 20". Capacities: to 60,000 g. p. m. Heads: to 750 lbs.

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corp.

FACTORIES
LOS ANGELES 31, CALIFORNIA • 301 West Avenue Twenty-six
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CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

	per cwt.
Blue Overalls	–5.50
Corduroy, Men's	–3.50
Corduroy, Ladies'	–3.00
Washables, No. 1	–3.00
Percales	–4.75
New Soft Blacks	–3.75
Light Prints, No. 1	–4.50
Khaki Cuttings—	
Bleachable	–4.25
Unbleachable	–3.50
New White Canvas	–6.50
New Mixed Blacks	–3.25
Canton Flannels, Bleached	–7.00
Shirt Cuttings—	
New White No. 1	–7.25
No. 1 White Headings	–7.25
White Shrunk	–5.00
Silesias No. 1	–5.75
New Unbleached	–7.50
Fancy	–3.50
Linen Cuttings—	
American	–5.00
White	–14.00
Grey	–14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowance of $1 to $2 a ton depending on the value of the grade involved.

Roofing	per ton
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
White, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

per cwt.

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints
} Nominal

RAGS (Foreign)

ex dock New York City

OLD RAGS

per cwt.

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Mod. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shopperies
} Nominal

ROPE and BAGGING

f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	$4.00 to 4.25

Wool Tares—	per cwt.
Light	4.00 to 4.25
Heavy	4.25 to 4.50
No. 1 Scrap Bagging	3.50 to 3.75
Manila Rope—	
No. 1 large	–*115.00
No. 1 small	–*105.00
Sisal Rope—	
No. 1 large	–*95.00
No. 1 small	–*80.00
New Burlap Cuttings	5.75 to 6.25
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	–*80.00
No. 2 sisal	–*60.00
Soft jute	5.00 to 5.50
Mixed	1.75 to 2.00

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment for machine compressed bales weighing not less than 500 pounds (with differential of $5 per ton less on certain grades for loose or bundled stock), and brokers' allowance of 4 to 9 per cent.

Shavings—	per ton
White Env. Cuts, One-Cut	67.50–
Hard White Env. Cuts	62.50–
Hard White, No. 1	57.50–
Soft White, No. 1	50.00–
Soft White, One-Cut	57.50–
Soft White, Misc.	43.00–
Fly Leaf, No. 1	33.50–
Fly Leaf, Woody, No. 1	25.00–
No. 2 Mixed Col. Woody	18.00–
Flat Stock—	
No. 1 Heavy Books and Magazines	38.50–
Mixed Books	22.00–
Ledger Stock—	
No. 1 White	46.00–
No. 1 Mixed (Colored)	40.00–
Manilas—	
New Env. Cuttings	53.00–
New Env. Cuts, One-Cut	57.50–
Extra Manilas	30.00–
Manila Tab Cards, Free of Ground Wood	45.00–
Ground Wood Manila Tab Cards	27.00–
Kraft—	
Envelope Cuttings	65.00–
Mixed Env. or Bag Cuts.	55.00–
Tripled Sorted No. 1 Brown	50.00–
New 100% Cur. Cuts	45.00–
No. 1 Old Assorted	35.00–
News—	
White Blank	33.00–
Overissue	22.00–
No. 1 Baled	20.00–
Old Corrugated Containers	28.00–
New Corrugated Cuts	18.00–
Mill Wrappers	22.00–
Box Board Chips	14.50–
No. 1 Mixed Paper	19.00–

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25–
Ground, cwt.	4.00–
Powdered, cwt.	4.40–
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to —
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	24.00 to 24.75
China Clay—	
Domestic Filler Bulk (mine) ton	8.00 to 15.00
Domestic Coating Bulk (mine) ton	13.00 to 22.00
Imported (ship side) Bulk (lump) ton	14.00 to 25.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	17.25 to 17.75
Litharge, powd., bbl., lb.	.08 to .09
Rosin (Gum)—	
New York, per 100 lbs.	
E	6.74—
F	7.37—
G	7.41—
WW	8.07—
Rosin (Wood), carlots	4.50—
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock—	
(Atl. ports) ton (Nom.)	20.00 to —
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30–
Ground and flake, drums, cwt.	2.70 to 2.95
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 55 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.72–
Pearl, barrels, cwt.	3.83–
Paper (8p.) bags, cwt.	3.83–
barrels, cwt.	3.93–
Sulphur (Crude) (Mine) bulk, long ton	16.00 to —
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Canadian	24.00 to —
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	5.60 to 6.10

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $6 per ton lower):

Bleached softwood sulphite	94.00
Unbleached softwood sulphite	82.00
Bleached hardwood sulphite	91.50
Unbleached hardwood sulphite	79.50
Northern bleached sulphate	94.00
Southern bleached sulphate	88.00
Northern semi-bleached sulphate	89.00
Southern semi-bleached sulphate	83.00
Northern unbleached sulphate	76.00
Southern unbleached sulphate	69.50
Bleached soda	84.00
Unbleached soda	80.00
Ground wood pulp	58.00
Ground wood—paper machine dried and mutilated	61.00
Sulphite screenings	45.50
Sulphate screenings	40.00
Ground wood screenings	34.00
Northern unbleached sulphate siderums	76.00
Southern unbleached sulphate siderums	69.50
Standard news print siderums	53.00

PAPER

f. o. b. New York City

Boards—	per ton
Binders	90.00—
Chip	82.00—
Chip, tube and can	85.00—
Chip, full-blending	87.50—
Chip, sgl. mla. lined	64.00—
Coated, white patent .016	82.00—
.020 and heavier	77.00—
Kraft liner	63.00—
News	52.00—
Container	54.00 to 56.50

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	9.25
B Grade E. F.	8.85
C Grade E. F.	8.55
D Grade E. F.	8.25
No. 2 Uncoated Offset 4 sides. White	8.45

Coated White (Trimmed 4 sides)

No. 1 Glossy	13.65
No. 2 Glossy	12.40
No. 3 Glossy	11.60
No. 4 Glossy	11.15
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.50
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.50
No. 1 (M.F.) watermarked	9.00	9.50
No. 2 (M.F.) watermarked	8.25	8.75
Plain (M.F.) unwatermarked	7.00	8.00

Sulphite Ledger—	per cwt. Zone
No. 1 (M.F.) watermarked	10.00
No. 2 (M.F.) watermarked	9.25
Plain (M.F.) unwatermarked	8.00

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleached (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleached (25 lb. up)	11.00 to 11.50
Unbleached (25 lb. up)	10.00 to 10.50

News—OPA Ceilings—	per ton
Rolls, Standard (Contract)	67.00
Rolls (Spot)	(Nominal)
Sheets	75.00

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.20
White, No. 2	.90 to 1.00
Bleached Anti-Tarnish	1.15 to 1.30
Colored	—
Anti-Tarnish Kraft	.78–
Manila	.90 to .95
Napkins, semi-crepe (12¾ lb. to M shts.) per cs.	.60–
Napkins, full crepe and emb'sed (12¾ lb to M shts.) per cs.	.60–
Toilet, Bleached (M shts.) per cs.	5.65
Toilet, Unbleached (M shts.) per cs.	4.25–

Towels—	per case
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.00

Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.00
No. 1 Wrapping	5.00 to 7.00
Standard Wrapping	4.75 to 7.10
Standard Bag	4.37½
Variety Bag	4.03½—

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached Papers—	per cwt.
M.F. & M.G. Waxing, 30 lb. (Carloads only) (10,000 lbs.)	7.25 to 7.50
Drug wrapp. 35 lb.	7.50 to 7.75
	7.00 to 7.25
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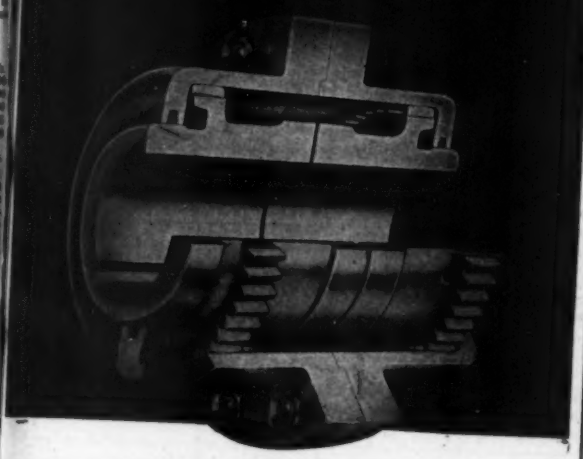

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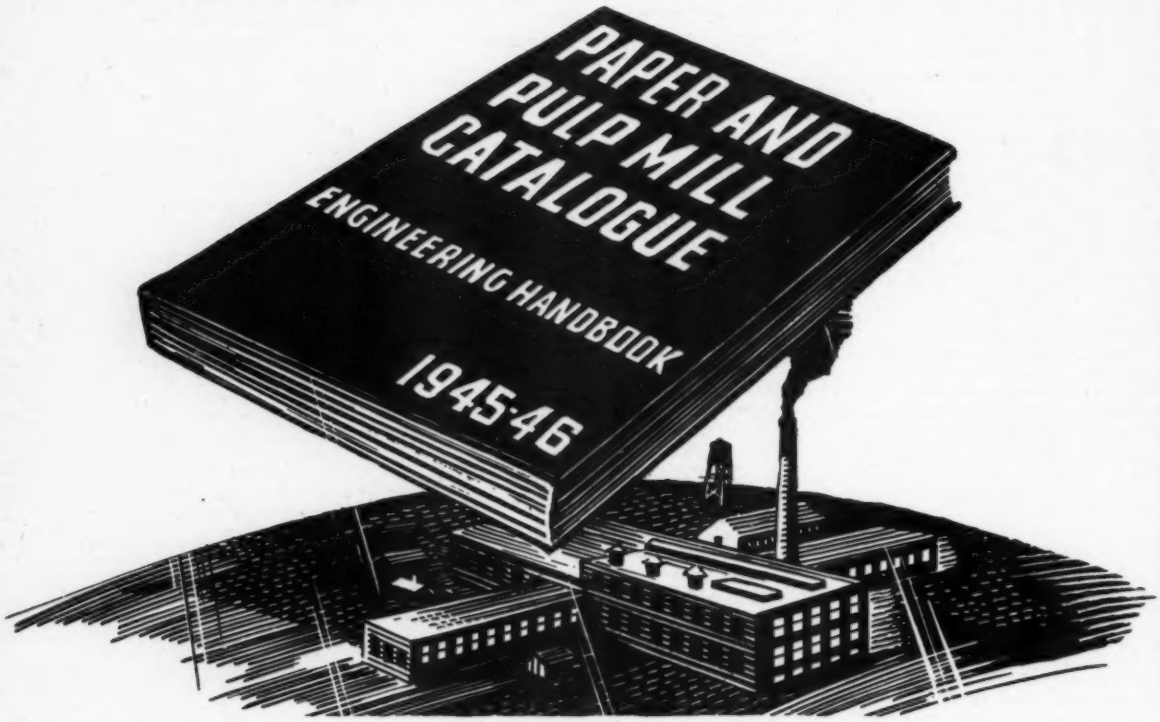

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SAMUEL M. LANGSTON COMPANY, CAMDEN, N. J.

Langston

SLITTERS AND ROLL WINDERS

TEXACO

REG. T. M.

Give Bearings *Greater* Protection

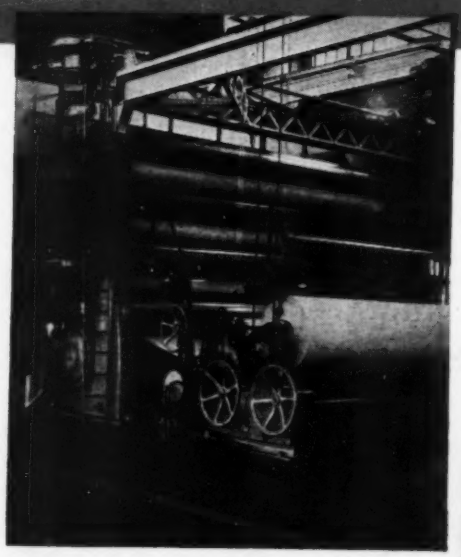
TEXACO REGAL STARFAK EXCEEDS EVERY REQUIREMENT FOR AN IDEAL ANTI-FRICTION BEARING LUBRICANT

TEST	REGAL STARFAK EXCEEDS REQUIREMENTS BY	BENEFIT TO YOU
Norma-Hoffman Oxidation Test: Measures stability of lubricating qualities. Test run for 100 hours at 210° F.	40%	Greater resistance to oxidation and gum formation.
Mechanical Worker Test: Measures consistency stability. Grease worked in ASTM mechanical worker for 100,000 strokes.	23.2%	Longer Lubricating Life.
Beater Test: Measures degree to which grease picks up air. Grease is beaten by eggbeater type mixer for 1 hour at 1000 rpm.	85.3%	Higher resistance to leakage and separation.
High Temperature Performance Test: Grease must lubricate ball bearing satisfactorily for not less than 1000 hours, at 10,000 rpm and 250° F.	89.8%	Greater protection against high bearing temperatures.
Low Temperature Torque Test: Measures ability of grease to lubricate satisfactorily at low temperatures. Test run at —40° F.	90%	Easier starting, lower power consumption.
Water Resistance Test: Ball Bearing must operate under water jet for 1 hour with no more than 50% grease loss.	100%	Greater protection against washout.

HIGH-SPEED, grease-lubricated ball and roller bearings used in paper mills last longer, give more efficient service, require fewer repairs and replacements when protected by *Texaco Regal Starfak*. The test results above show why.

Texaco Regal Starfak is the result of years of research by Texaco engineers, working with the full cooperation of leading ball and roller bearing manufacturers. Use it, and get improved performance and low maintenance costs.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO

TEXACO Lubricants and Fuels

FOR THE PAPER INDUSTRY

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT STARRING JAMES MELTON WITH HIS GUEST, ED WYNN—C